MINICHEF™ 2000

Hardware & Software Setup Guide

For All Applications

WATLOW

CE 97

TOTAL CUSTOMER SATISFACTION

ISO 9001

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WATLOW MINICHEF™ 2000

All Applications
Hardware & Software Setup Guide

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Cook-&-Hold Ovens

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Introduction

Welcome to the MiniChef 2000™

The MiniChef 2000 is a configurable, time/temperature and machine function controller that is preprogrammed for dozens of cooking applications. Its compact size and optional horizontal/vertical orientation facilitates streamlined equipment design. It withstands rigorous application environment conditions, with an 80ºC ambient rating and superior EMI/RFI immunity. It is also backed by Watlow's exclusive three-year warranty.

Each unit is equipped to offer:

- two temperature sensor inputs
- two event inputs (for machine control)
- two heat control outputs
- two event outputs (for machine control)
- one audible alarm output

(See diagram below.)

Depending on the application software you select, some or all of the inputs or outputs are used. See the Application Selection Table that follows.

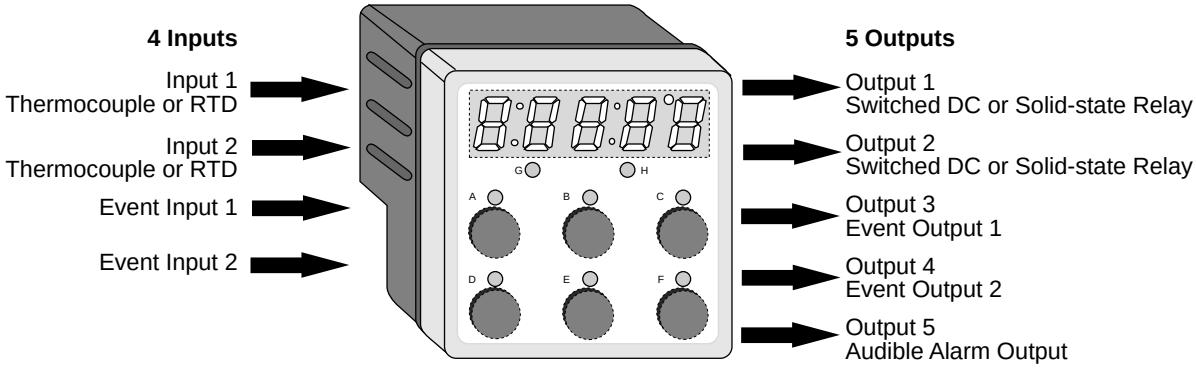


Figure 3 — Inputs and outputs.

MiniChef™ 2000 Application Software Selection Table

To select the application software that best suits your equipment and purpose, first locate the type of equipment in the left column, then check the other columns for features and options you need. The application number is on the right (Appl#). Make a note of the application number. You will be using this number later when programming your controller. The guide for each application contains specific configuration and programming parameters, and operating instructions. Note that the use of the software below is not limited to the equipment types listed in the first column.

Intended Equipment Type (May also apply to other apps)	Operation Mode	No. of Menus	Heat Output Channels	Timed Zones	Meat Probe	Fan Speeds	Steps	Appl #	Notes
COOK & HOLD OVENS									
	Auto	6	Single	1	Yes	1 or 2	2	**1**	
	Auto	17	Single	1	Yes	1 or 2	2	**2**	
	Auto	6	Single	1	No	1 or 2	2	**3**	
	Auto	20	Single	1	No	1 or 2	2	**4**	
	Manual	N/A	Single	1	Yes	No	1 or 2	**5**	
	Manual	N/A	Single	1	No	No	1 or 2	**6**	
CONVECTION OVENS									
	Auto	6	Single	1	No	1 or 2	4	**7**	
	Auto	15	Single	1	No	1 or 2	4	**8**	
	Manual	N/A	Single	1	No	1 or 2	1 or 2	**9**	
DEEPFAT FRYERS									
	Auto	4	Single	1	No	No	1	**10**	
	Auto	40	Single	1	No	No	1	**11**	
	Manual	N/A	Single	1	No	No	1	**12**	
Pressurized	Auto	6	Single	1	No	No	1	**13**	
Pressurized	Auto	40	Single	1	No	No	1	**14**	
Pressurized	Manual	N/A	Single	1	No	No	1	**15**	
	Auto	6	Single	1	No	No	1	**16**	
	Auto	2/4	Single	2	No	No	1	**17**	
	Auto	40	Single	1	No	No	1	**18**	
	Manual	N/A	Single	1	No	No	1	**19**	
GRIDDLES									
Clam Shell	Auto	6	Dual	1	No	No	1	**20**	
Clam Shell	Manual	N/A	Dual	1	No	No	1	**21**	
One-sided	Auto	6	Single	1	No	No	1	**22**	
One-sided	Manual	N/A	Single	1	No	No	1	**23**	
TIMERS									
No temp. control	Auto	6	N/A	6	No	No	1	**24**	
No temp. control	Manual	N/A	N/A	1	No	No	1	**25**	
SHELF TIMER	Auto	6	Single	6	No	No	1	**26**	
ROTISSERIE OVENS									
	Manual & Auto	30	Single	1	Yes	Yes (1)	1 or 2	**27**	
	Manual	N/A	Single	1	Yes	Yes (1)	1 or 2	**28**	

Table 4 — Application selection table.

Overview of Key Steps, from Installation through Operation:

1 Install the controller

- Use the panel knock-out pattern guidelines in this guide.

2 Wire the controller

- Use the connector/wiring information in this guide.

3 Configure the controller

- After applying power, use the Configuration Mode to enter the equipment Application Number (from the MINICHEF 2000 Software Selection table), set up the controller and access the thermal optimization functions.
- Use the space provided to record your values for future reference.
- Set the Application Number Security Lock, if necessary, to prohibit end users from changing Application Number.
- To speed configuration, you may want to use the Prototyping/Training Overlay (available separately, see Ordering Information in this guide).

Note: Always select and enter the application number first. The parameters that follow are based on it. See instructions in this *Hardware & Software Setup Guide*.

4 Program the menus (automatic menu applications only)

- Use the Program Mode to program automatic menus for the chosen application. See instructions in this guide.
- Use the space provided to record your values for future reference.
- To ease menu programming, you may want to use the Prototyping/Training Overlay (available separately, see Ordering Information in this guide).

5 Set menu security (automatic menu applications only)

- Set up menu security, if necessary, to prohibit end users from changing values. (Because the controller defaults to no security, the end user may be able to access the Program Mode to change parameter values based on menu.) See instructions in this guide.

6 Set Real-time Clock

This applies only to controllers purchased with the Real-time Clock option. It allows you to see the time of day instead of “idle” on the display.

7 Design faceplate overlay

- Use the Overlay Design Guidelines in this guide to design, manufacture and apply a membrane overlay for the controller faceplate. This custom-designed overlay becomes the end-user interface.
- For overlay designs to suit specific applications, see the suggestions in each application guide.

8 Operate the MINICHEF 2000

- Use the Operation Mode to run the installed controller. This is the default mode. Operation instructions are included in each application guide.

General Description

Getting to know your MiniChef™ 2000

Front view

Back view

Shown with mating connector terminals installed. Mating connectors and terminals are purchased separately.

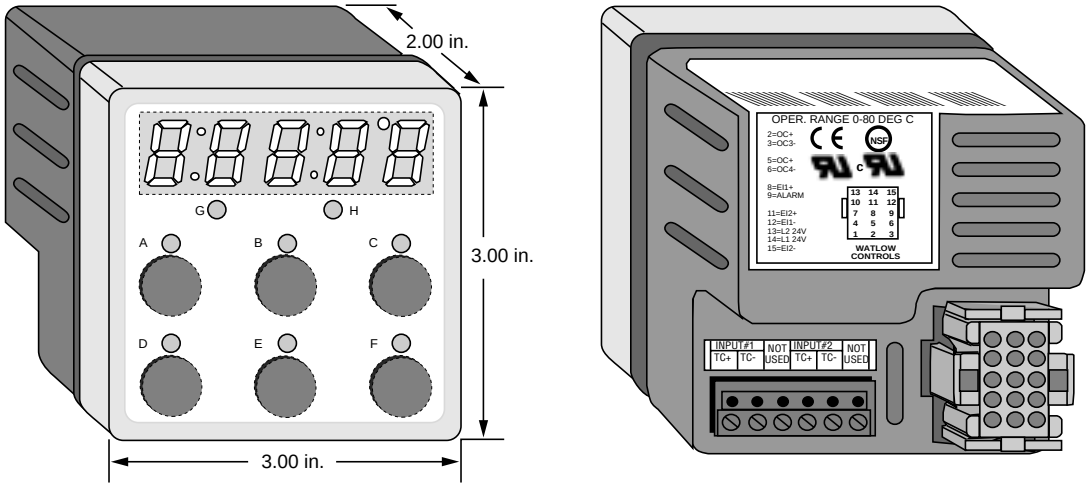


Figure 6a — Front and back view.

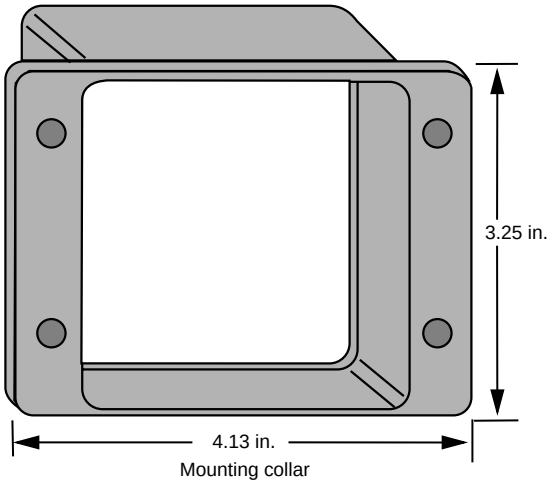


Figure 6b — Mounting collar.

Dimensions:

Overall width x height x depth (Includes MiniChef 2000 with mounting collar and space required for mating connectors. Does not include wire bundle space requirements):

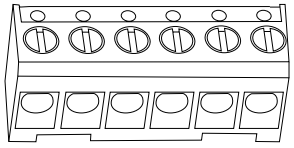
4.13 in x 3.25 in x 2.00 in (with collar mounted in horizontal position)
3.25 in x 4.13 in x 2.00 in (with collar mounted in vertical position)

Mating Connectors (purchased as an accessory — not included):

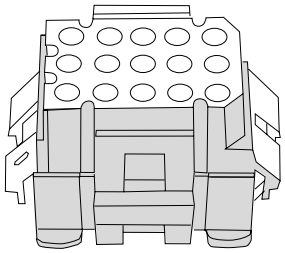
See Accessories ordering information about the following mating connectors:

Sensor Input Mating Connector: RIA Electronic Inc. RIACON #31007106, 6-position, quick-connect terminal, screw connection for 28-14 AWG wires, tighten to 7 in/lb.

Power Supply and Input/Output Mating Connector Kit: Kit includes: one AMP #1-640523-0 quick-connect terminal and fifteen AMP #641300-1 crimp pins.



Sensor Input Mating Connector



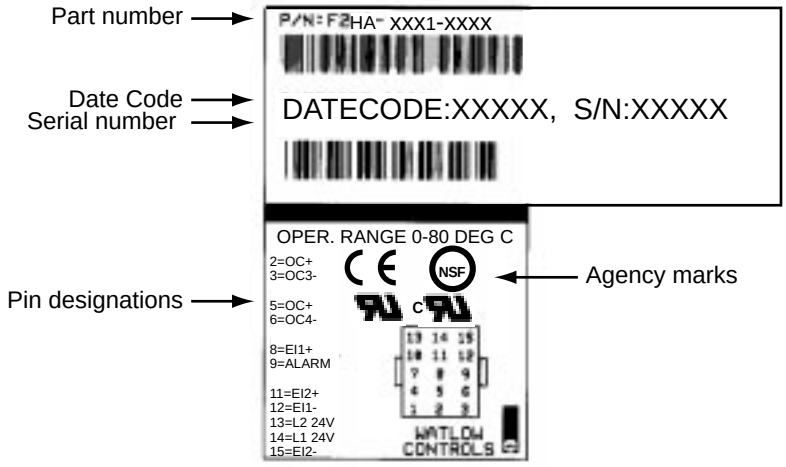
Power Supply and Input/Output Mating Connector

Figure 7a — Mating connectors.

Note: Position mating connector with beveled edges at the top. They are not visible from the front.

Label Information:

Main Label



Sensor input label

If RTD sensors are specified:

INPUT 1			INPUT 2		
S1	S2	S3	S1	S2	S3
1	2	3	4	5	6

If thermocouples are specified:

INPUT 1		NOT USED	INPUT 2		NOT USED
TC+	TC—		TC+	TC—	
1	2	3	4	5	6

Figure 7b — Labels.

Step 1 Install the Controller

- Select sheet metal (16-, 18-, 20- or 22- gauge panel).
- For panel knock-out patterns, see subsequent pages of this guide.
- Use #6-32 mounting studs x 0.50” length minimum, either pressed or welded.
- Install the unit with either a horizontal or vertical mounting collar position.
- Install mating connectors to unit.

Note: This device should be used in systems that incorporate a separate high limit device for safety.

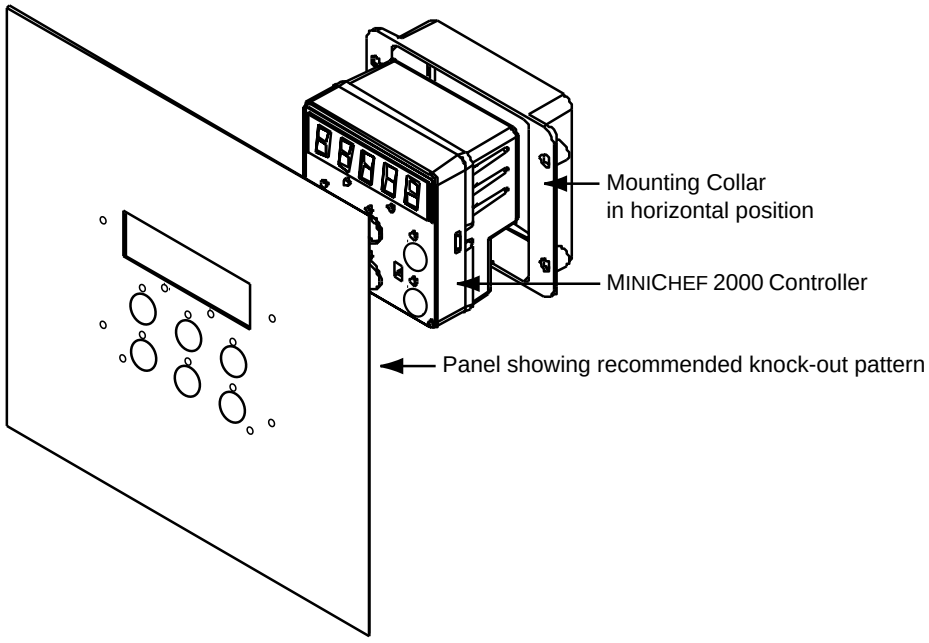


Figure 8 — Mounting the MINICHEF 2000.

Panel Knock-out Pattern for a Mounting Collar in a Horizontal Position

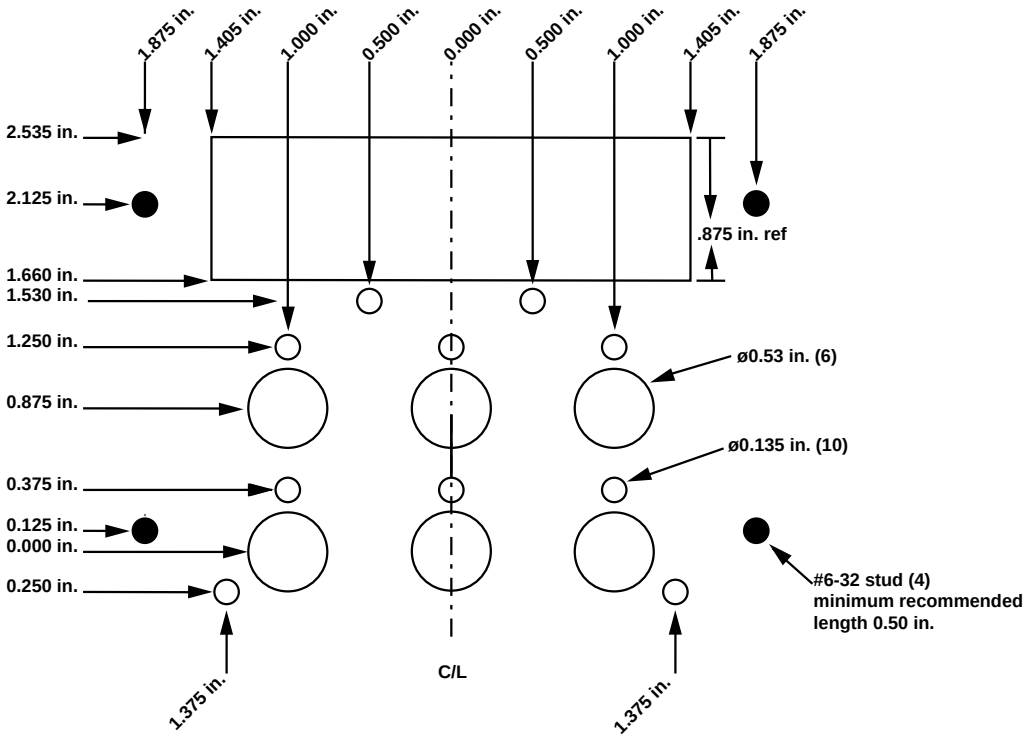


Figure 9a — Pattern for horizontal panel 16- or 18-gauge thick.

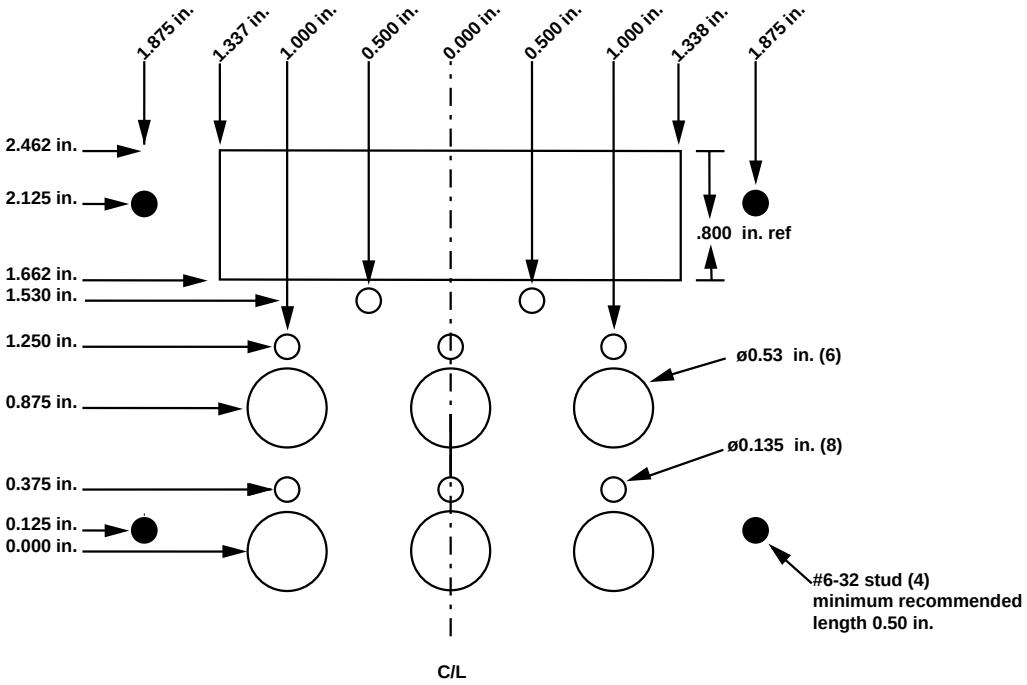


Figure 9b — Pattern for horizontal panel 20- or 22-gauge thick.

Panel Knock-out Pattern for a Mounting Collar in a Vertical Position

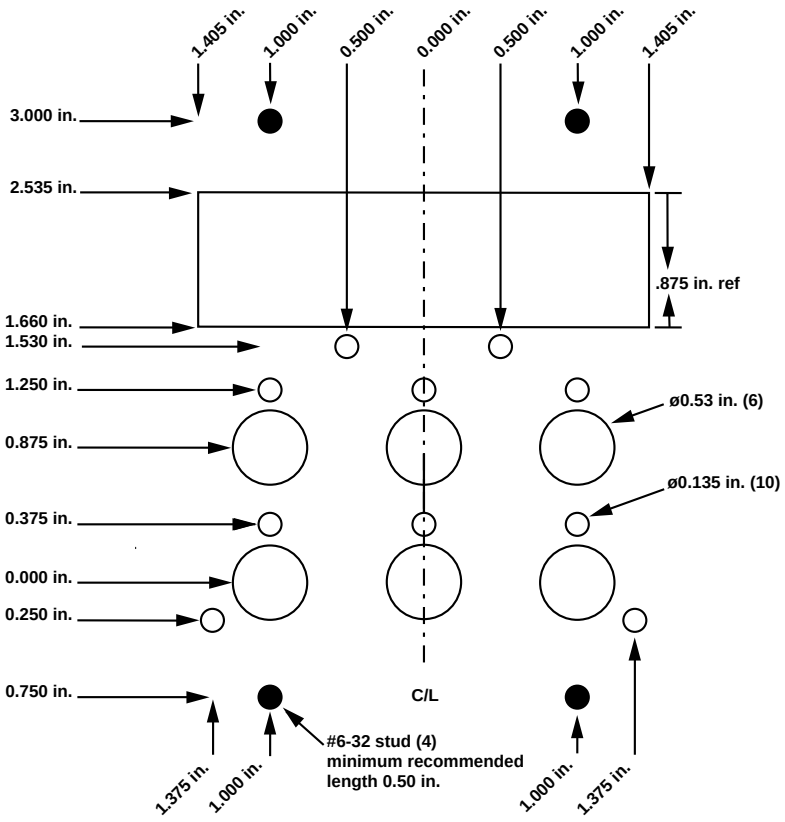


Figure 10 — Pattern for vertical panel 16- or 18-gauge thick.

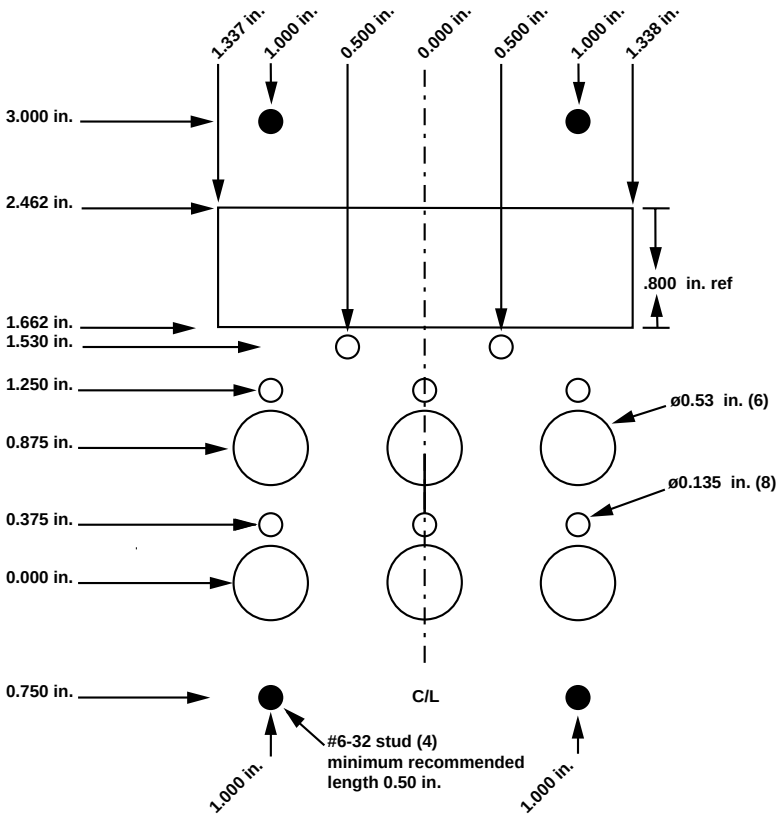


Figure 11 — Pattern for vertical panel 20- or 22-gauge thick.

Step 2 Wire the Controller

Position the connector with the beveled edges at the top.

Not all software applications use or require wiring to all inputs and outputs. For specific information consult the guide for the application you are using.

Note: The following illustration is a view of the back of the controller, not of the mating connector.

Power Wiring

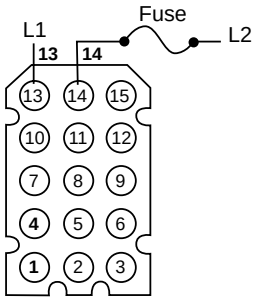
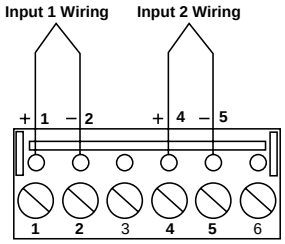


Figure 12a — 24V~ (ac) Low Voltage.

WARNING: To avoid potential electric shock, use National Electric Code (NEC) safety practices when wiring and connecting this unit to a power source and to electrical sensors of peripheral devices. Failure to do so could result in injury or death.

Sensor Inputs 1 and 2

Note: The following illustrations are views of the back of the mating connector, not of the controller.



F 2 _ _ – 1 _ _ _ - _ _ _ _ (Type J, K, or E).

Figure 12b — Dual Thermocouple Option.

Dual RTD Option (platinum)

F 2 _ _ – 2 _ _ _ – _ _ _ _ (100Ω RTD, curve selectable)

F 2 _ _ – 3 _ _ _ - _ _ _ _ (500Ω RTD, curve selectable)

F 2 _ _ – 4 _ _ _ - _ _ _ _ (1000Ω RTD, curve selectable)

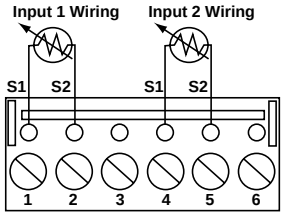


Figure 13a — 2-wire RTD.

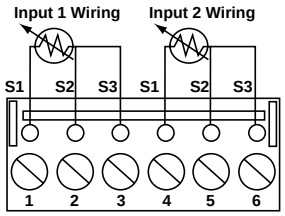
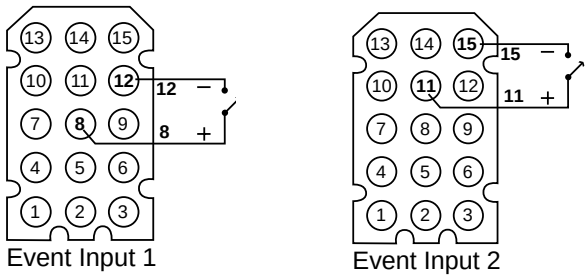


Figure 13b — 3-wire RTD: (will function as a 2-wire RTD).

Note: If your chosen software application does not require two sensor inputs, it is not necessary to wire Input 2. For specific information, consult the application guide for the application you are using.

Event Inputs 1 and 2

Note: The following illustration is a view of the back of the controller, not of the mating connector.



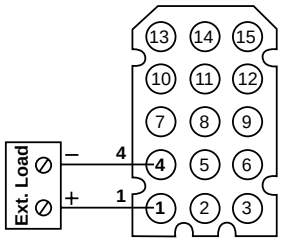
F 2 _ _ - _ _ _ _ - _ _ _ _

Figure 13c — Switched DC (two per unit, non-isolated).

Note: Not all software applications require event inputs 1 and 2. For specific information consult the application guide for the application you are using.

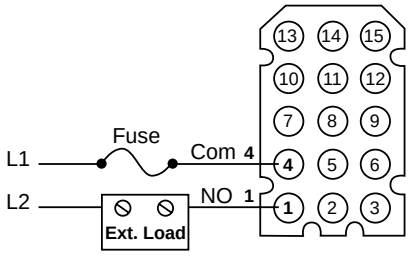
Output 1

Note: The following illustrations are views of the back of the controller, not of the mating connector.



F 2 _ _ – _ 1 _ _ – _ _ _ _

Figure 14a — Switched DC Option (5V nominal, 30mA, non-isolated).



Form A, 0.4A, with or without RC Suppression

F 2 _ _ – _ 2 _ _ – _ _ _ _ (without RC Suppression)

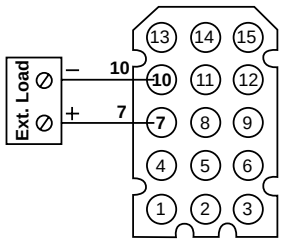
F 2 _ _ – _ 3 _ _ – _ _ _ _ (with RC Suppression)

Figure 14b — Solid-state Relay Option.

Note: Not all software applications require Output 1. For specific information consult the application guide for the application you are using.

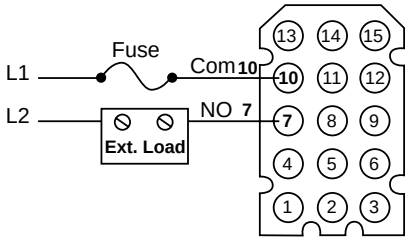
Output 2

Note: The following illustrations are views of the back of the controller, not of the mating connector.



F 2 _ _ - _ _ 1 _ – _ _ _ _

Figure 15a — Switched DC Option (5V nominal, 30mA, non-isolated).



Form A, 0.4A, with or without RC Suppression

F 2 _ _ - _ _ 2 _ - _ _ _ _ (without RC Suppression)

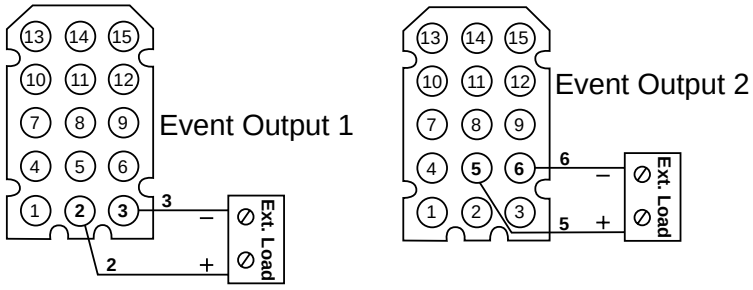
F 2 _ _ - _ _ 3 _ - _ _ _ _ (with RC Suppression)

Figure 15b — Solid-state Relay Option.

Note: Not all software applications require Output 2. For specific information consult the application guide for the application you are using.

Event Output 1 and Event Output 2

Note: The following illustrations are views of the back of the controller, not of the mating connector.



F 2 _ _ - _ _ _ 1 - _ _ _ _ (switched dc, 5V nominal, 30mA, non-isolated outputs)

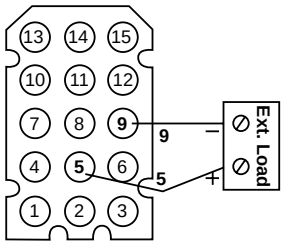
Figure 16a — Event Outputs.

Warning: If event outputs 1 & 2 are used to cause or initiate machine motion, appropriate reasonable care should be taken to prevent personal injury or machine damage as a result of machine motion.

Note: Not all software applications require event outputs 1 & 2. For specific information consult the application guide for the application you are using.

Output 5: Audible Alarm Output Signal Option

Note: The following illustrations are views of the back of the controller, not of the mating connector.



Alarm signal available at connector, 5V nominal, 30ma, non-isolated.

F 2 _ _ - _ _ _ _ - _ 0 _ _ (unit without internal audible alarm)

Figure 16c — Switched DC.

Note: Pin 5 is shared with event output 2 wiring.

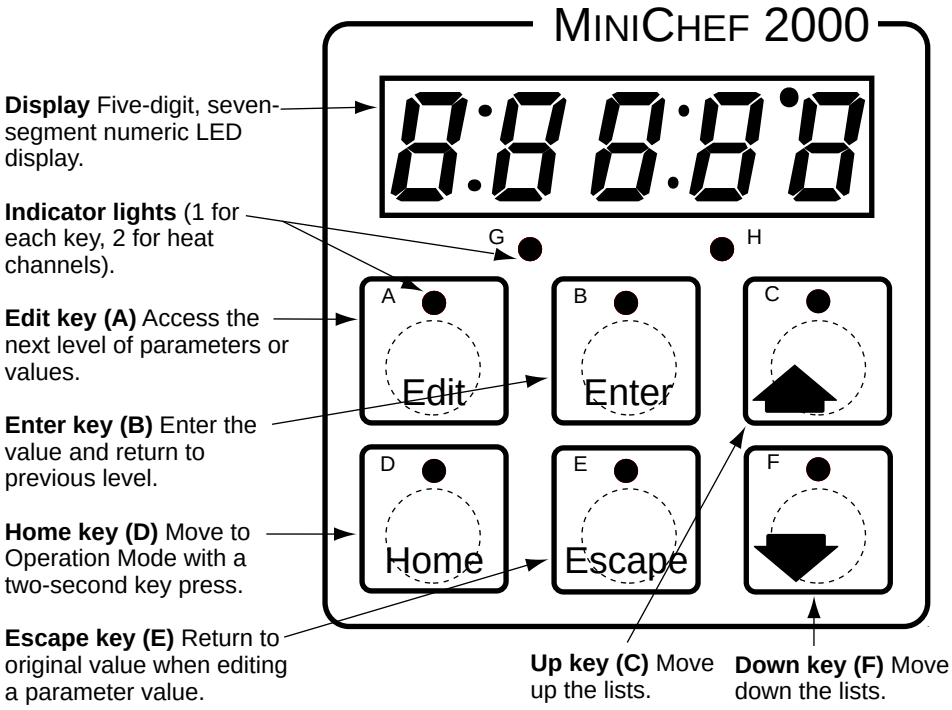
Step 3 Configure the Controller

Overview of Configuration

- Get to know the keys and how they function in different modes.
- Review configuration and programming procedures in this guide.
- Choose applications, functions, parameters and values (see Application Software Selection Table in this guide).
- Review the operating instructions (in each application guide).
- Get a complete idea of how the application works.

Controller Front Panel Layout

During configuration and programming, this is how the keys work:


MINICHEF 2000
Display Five-digit, seven-segment numeric LED display.
Indicator lights (1 for each key, 2 for heat channels).
Edit key (A) Access the next level of parameters or values.
Enter key (B) Enter the value and return to previous level.
Home key (D) Move to Operation Mode with a two-second key press.
Escape key (E) Return to original value when editing a parameter value.
G
H
A
B
C
Edit
Enter
D
E
F
Home
Escape
Up key (C) Move up the lists.
Down key (F) Move down the lists.

Note: To order this helpful Prototyping/Training Overlay, see Ordering Information in this guide.

Note: In the Operation Mode, the keys will function differently, depending on the chosen application number. For more information, see individual application guides.

Software Structure

The MINICHEF 2000 software uses three modes — Configuration Mode, Programming Mode and Operation Mode — and each mode contains up to three levels of functions, parameters and values. The Operation Mode is the default mode.

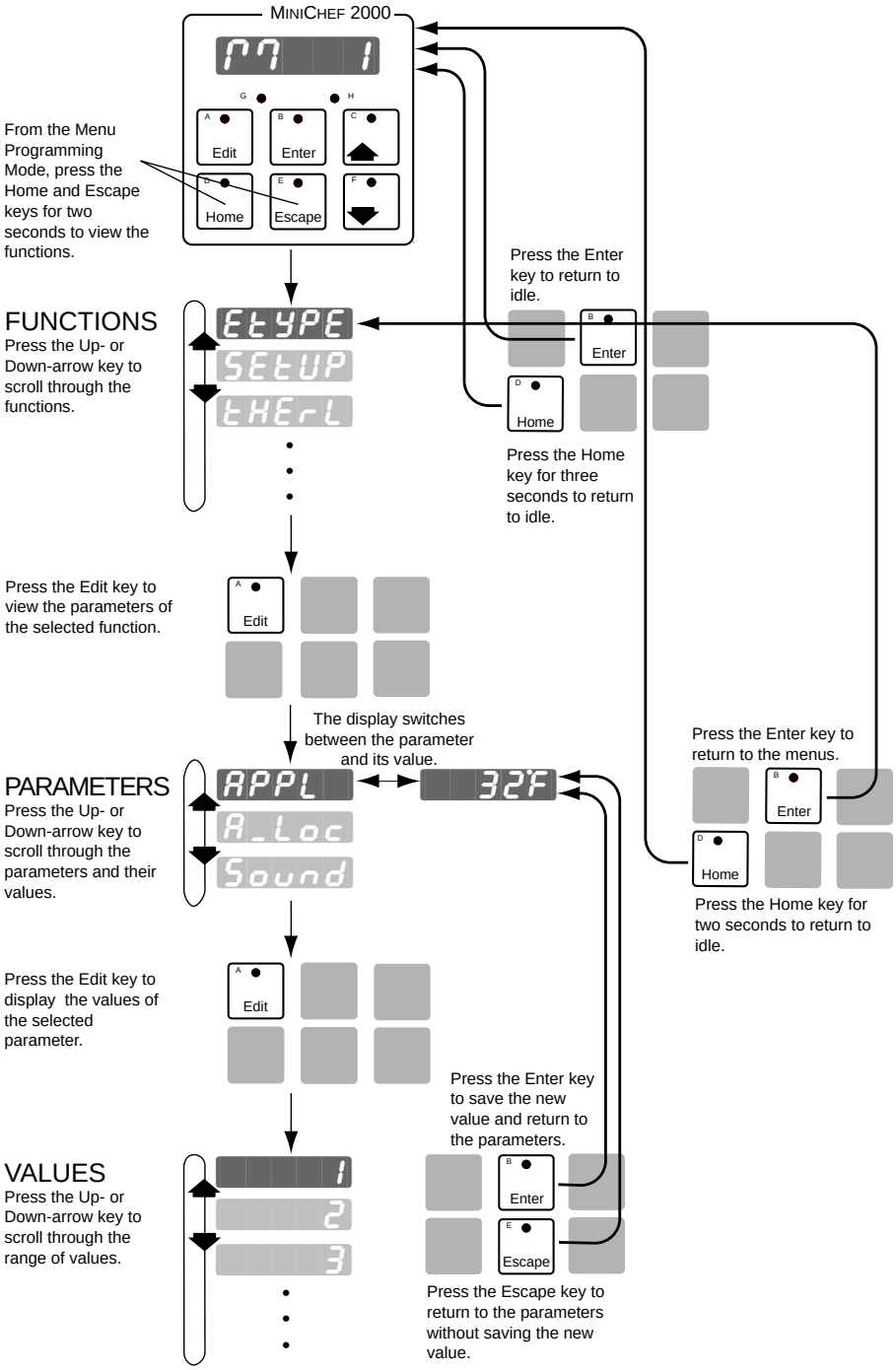

MINICHEF 2000
Edit
Enter
Home
Escape
From the Menu Programming Mode, press the Home and Escape keys for two seconds to view the functions.
FUNCTIONS
Press the Up- or Down-arrow key to scroll through the functions.
ETYPE
SETUP
THERL
Press the Enter key to return to idle.
Press the Home key for three seconds to return to idle.
Press the Edit key to view the parameters of the selected function.
The display switches between the parameter and its value.
PARAMETERS
Press the Up- or Down-arrow key to scroll through the parameters and their values.
APPL
32F
A_Loc
Sound
Press the Enter key to return to the menus.
Press the Home key for two seconds to return to idle.
Press the Edit key to display the values of the selected parameter.
Press the Enter key to save the new value and return to the parameters.
VALUES
Press the Up- or Down-arrow key to scroll through the range of values.
1
2
3
Press the Escape key to return to the parameters without saving the new value.

Figure 18 — Navigating in Configuraton Mode.

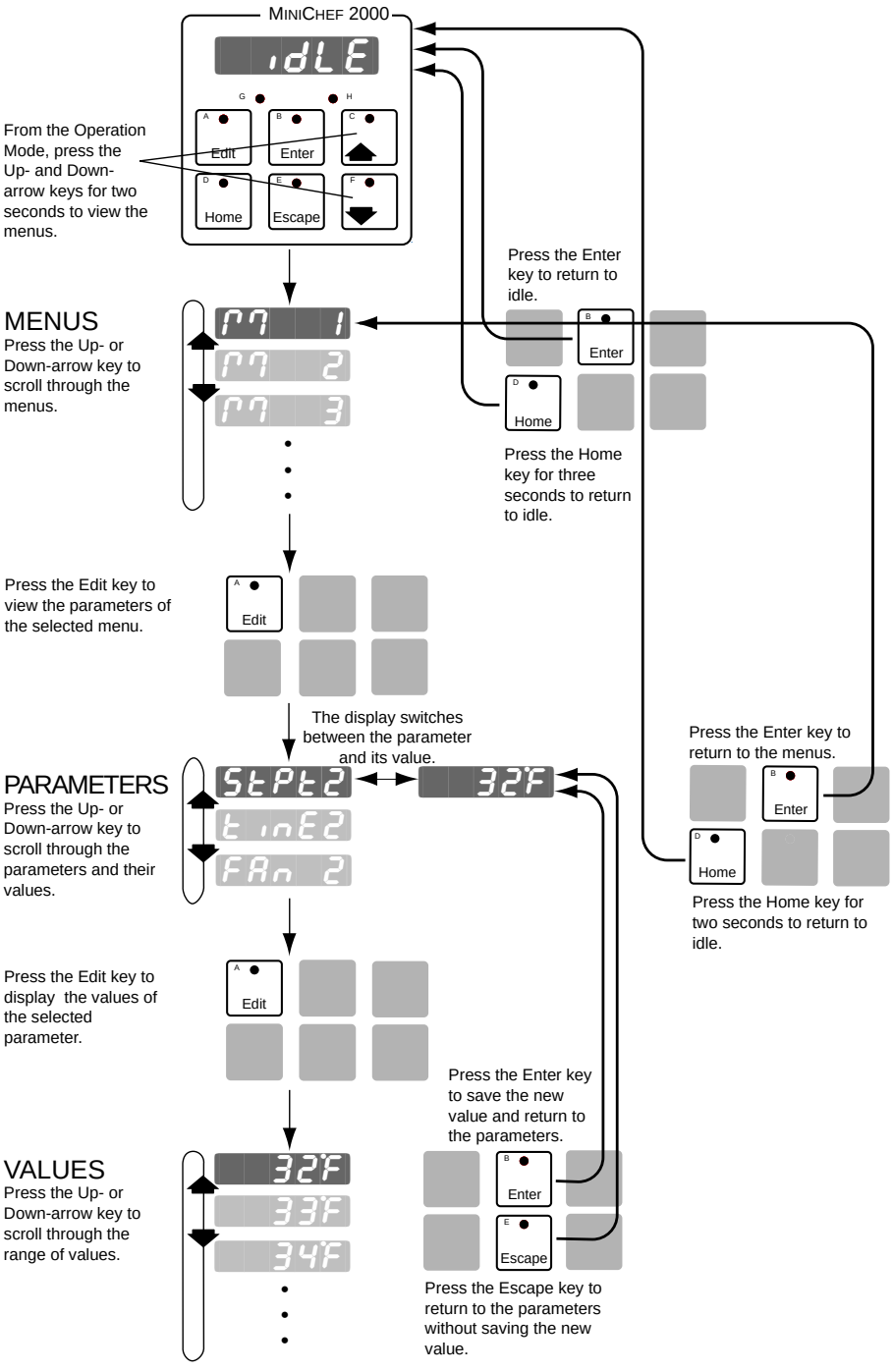

MINICHEF 2000
idLE
Edit
Enter
Home
Escape
From the Operation Mode, press the Up- and Down-arrow keys for two seconds to view the menus.
MENUS
Press the Up- or Down-arrow key to scroll through the menus.
Press the Enter key to return to idle.
Press the Home key for three seconds to return to idle.
Press the Edit key to view the parameters of the selected menu.
The display switches between the parameter and its value.
PARAMETERS
Press the Up- or Down-arrow key to scroll through the parameters and their values.
Press the Enter key to return to the menus.
Press the Home key for two seconds to return to idle.
Press the Edit key to display the values of the selected parameter.
Press the Enter key to save the new value and return to the parameters.
VALUES
Press the Up- or Down-arrow key to scroll through the range of values.
Press the Escape key to return to the parameters without saving the new value.

Figure 19 — Navigating in Menu Programming Mode.

Configuration Mode Quick Reference

This is a list of all functions, parameters and values that are available through the Configuration Mode. (They are not all available for every application.) For a detailed explanation of parameters see the Appendix in this guide.

Function		Parameter		Value	Your Setting
EtYPE	Equipment Type	APPL	Application Number	1 - 28	
		A_Loc	Application Number Security Lock	Yes, No	
		Sound	Audible Alarm Sound	0 - 5	
		bt inE	Basket Travel Time	0 - 30 sec	
		Pt inE	Pressure Release Time	1 - 120 sec (from end of menu)	
		PrEHt	Preheat Temperature	temp range low - range high	
		idLE1	Idle Temp Number 1	temp range low - range high	
		idLE2	Idle Temp Number 2	temp range low - range high	
		t OUt	Timer output 4	Yes, No	
		StEPS	Number of cooking steps	1 or 2	
		MELt	Oil Melt Cycle	On, Off	
		FAn	Fan Speed	1-speed, 2-speed	
		dELAY	Fan Delay Time	0 - 120 minutes	
		SEtPt	Temperature Set Point	temp range low - temp range high	
		ProbE	Meat/Food Temperature Probe	Yes, No	
SEtUP	Setup	C_F	Temperature Display Format	ºC or ºF	
		t.FMt	Time Display Format	MMM:SS, HH:MM, H:MM:SS (H=Hours, M=Minutes, S=Seconds	
		ChirP	Key Chirp	On, Off	
		Loc	Menu Security Lock	Yes, No	
		tc	Thermocouple Type	J, K (shown as H), E	
		rtd	RTD Curve	DIN, JIS	
		tconP	WatCurve™Temperature Compensation	On, Off	
		OFSt1	Temp Offset, Channel 1	-99 to 99º F (-55 to 55º C)	
		OFSt2	Temp Offset, Channel 2	-99 to 99º F (-55 to 55º C)	
		tr Lo	Temperature Range Low	0ºF (-18ºC) for rtd inputs, 32ºF (0ºC) for tc inputs to temp range high	
		tr Hi	Temperature Range High	temp range low to 1200ºF (649ºC)	
		rEAdy	Ready/Preheat Feature	Yes, No	
		rbAnd	Ready Band	1 to 1200ºF (649ºC)	
		CLoc	Real Time Clock Display	Yes, No	
		PLOSS	Power Loss Menu Resume	Yes, No	
		AL 1	Alarm, Channel 1	None, Dev, Proc, Both	
		AL P1	Absolute Process Alarm, Channel 1	100 to 1200ºF (38 to 649ºC)	
		AldL1	Low Deviation Alarm, Channel 1	-999 to 0ºF (-555 to 0ºC)	
		AldH1	High Deviation Alarm, Channel 1	0 to 999ºF (0 to 555ºC)	
		AL 2	Alarm, Channel 2	None, Dev, Proc, Both	
		AL P2	Absolute Process Alarm, Channel 2	100 to 1200ºF (38 to 649ºC	
		AldL2	Low Deviation Alarm, Channel 2	-999 to 0ºF (-555 to 0ºC)	
		AldH2	High Deviation Alarm, Channel 2	0 to 999ºF (0 to 555ºC)	

Function	Parameter		Value	Your Setting
tHErL Thermal	tYPE	Temperature Control Type	PID, On-Off	
	HYSt1	Hysteresis 1	1 to 99ºF (1 to 55ºC)	
	HYSt2	Hysteresis 2	1 to 99ºF (1 to 55ºC)	
	Pid U	PID Units	SI, US	
	tunE1	Auto-tuning, Channel 1	on, OFF	
	tunE2	Auto-tuning, Channel 2	on, OFF	
	ProP1	Proportional Band 1	1 to 999ºF (1 to 555ºC)	
	rSEt1	Reset (integral) Gain 1	0.00 to 9.99 repeats/minute	
	int 1	Integral Gain 1	0.00 to 99.99 minutes/repeat	
	rAtE1	Rate (derivative) Gain 1	0.00 to 9.99 minutes	
	dEr 1	Derivative Gain 1	0.00 to 9.99 minutes	
	CYcL1	PID Cycle Time 1	1 to 60 seconds	
	ProP2	Proportional Band 2	1 to 999ºF (1 to 555ºC)	
	rSEt2	Reset (integral) Gain 2	0.00 to 9.99 repeats/minute	
	int 2	Integral Gain 2	0.00 to 99.99 minutes/repeat	
	rAtE2	Rate (derivative) Gain 2	0.00 to 9.99 minutes	
	dEr 2	Derivative Gain 2	0.00 to 9.99 minutes	
	CYcL2	PID Cycle Time 2	1 to 60 seconds	
diAG WatHelp Diagnostics	dAtE	Date-of-Manufacture Code	YYDDD	
	SEr n	Serial Number	XXXXX	
	PArt1	Part Number-first four digits	**F2XX**-XXXX-XXXX	
	PArt2	Part Number-middle four digits	F2XX-**XXXX**-XXXX	
	PArt3	Part Number-last four digits	F2XX-XXXX-**XXXX**	
	S rEU	Software Revision Number	XX	
	idEnt	Key Function Identification	Yes, no	
	APPL	Current Application Number	XX	
	88888	Display Test	All spot LEDs and all main-display LEDs will light up	
	OutPt	Output Test	0=All outputs are normal 1=Output 1 is on. All others are off. 2=Output 2 is on. All others are off. 3= Event Output 1 is on. All others are off. 4=Event Output 2 is on. All others are off. 5=Output 5 is on. All others are off. 6=All outputs are on.	
	inPut	Event Input Test	0=Both Event Inputs are off. 1=Event Input 1 is on. 2=Event Input 2 is on. 3=Both Event Inputs are on.	
	tEMP1	Actual Temperature Channel 1 (w/out offset)	XXXX ºF/ºC	
	tEMP2	Actual Temperature Channel 2 (w/out offset)	XXXX ºF/ºC	

On/off Temperature control

On/off control switches the heat outputs either full on or full off, depending on the temperature sensor input, set point and hysteresis values. The hysteresis value creates a buffer zone that increases the time interval that the output is off or on. With hysteresis set to 1º the process value would stay closer to the set point, but the output would switch on and off more frequently.

PID Temperature control (Proportional, Integral, Derivative)

Proportional control: Some processes need to maintain a temperature or process value closer to the set point than On/off control can provide. Proportional control provides closer control by adjusting the output when the temperature or process value is within a proportional band. When the value is in the band, the controller adjusts the output based on how close the process value is to the set point: the closer to set point the lower the output. This is similar to backing off on the gas pedal of a car as you approach the speed limit. It keeps the temperature or process value from swinging as widely as it would with simple On/off control. However, when a system stabilizes, the temperature or process value tends to "droop" short of the set point.

Proportional plus Integral: The droop caused by proportional control can be corrected by adding integral (reset) control to the system. When the system has settled down, the integral (reset) value is tuned to bring the temperature or process value closer to the set point. However, this increases the overshoot that occurs at startup or when the set point is changed.

Proportional, Integral, Derivative control (PID): Use derivative (rate) control to minimize the overshoot in a Proportional-Integral controlled system. Derivative (rate) adjusts the output based on the rate of change in the temperature or process value.

Auto-tuning

Auto-tuning is a feature that simplifies the determination of PID values (an otherwise tedious, time-consuming system tuning process.) Auto-tuning allows the controller to automatically explore the responsiveness of the complete system to determine an effective set of parameters for PID control. To do this it crosses an auto-tune set point three times, then controls at the normal set point using the new parameters. Once the auto-tuning cycle is complete, the optimized PID values are stored in the controller memory automatically.

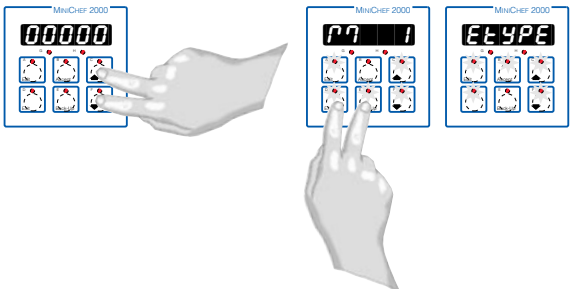
Configuration Procedure

Power up the control (24V~ (ac) source required).

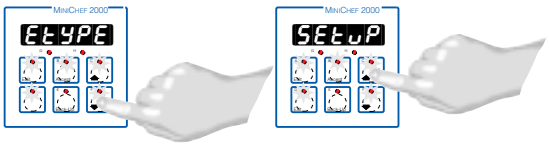
1. Access the Configuration Mode by pressing the Up-arrow and Down-arrow keys simultaneously for two seconds.

   for automatic applications will appear on the display. will appear in manual applications.

   Then press the Home key and the Escape key simultaneously for two seconds. will appear on the display. It is the first in a list of functions. You are now in the Configuration Mode.

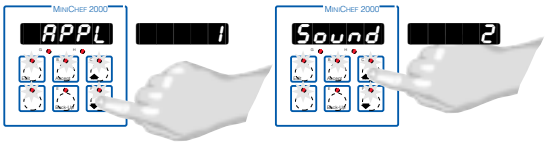


2. To move down the list of functions press the Down-arrow key. To move up, press the Up-arrow key.



3. To access the parameter list: with the appropriate function on the display, press the Edit key. The first in a list of parameters will appear on the display, which will alternate between the parameter and its value.

4. To move down the list of parameters press the Down-arrow key. To move up, press the Up-arrow key.



5. To access a parameter (in order to change its value): with the parameter on the display, press the Edit key. The first in a list of values will appear on the display.

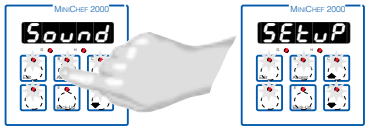
Note: When you are configuring your controller, always edit ETYPE and set the application number first (for example, APPL 20). The parameters that follow are based on it. In general, parameters that appear earlier on the list can influence the parameters and values that follow.

6. To change a value: press the Down-arrow key or the Up-arrow key.

7. To save the new value, which is on the display, press the Enter key. You will return to the parameter list and the new value will flash to confirm that it has been accepted.

   If you do not want to enter the new value, press the Escape key. You will return to the parameter list without making the change.

8. Repeat 4 through 7 until all values for this application have been programmed.
9. To leave the parameter list, press the Enter key. You will move to the function list.



10. Repeat 2 through 9 until the Equipment-Type, Setup and Thermal functions have all been programmed. (The Diagnostics function is used for troubleshooting and is read-only. No programming required.)
11. To leave the function list and exit the Configuration Mode, press the Enter key twice.

Note: You can also exit the Program Mode from the parameter list or function list by pressing the Home key for two seconds or by pressing the Enter key repeatedly.

Step 4 Program the Menus

Program Mode Quick Reference

These are the functions, parameters and values that may be included in the Program Mode. Not all parameters will appear. Different parameters are relevant in different application numbers. For a detailed explanation, see the Appendix in this guide.

Function	Parameter	Value/Description	Your Settings
Menu Numbers XX	**StPt1** Set point 1 Temperature of set point 1.	Temp range low - temp range high	
	tiME1 Time 1 Run time of set point 1.	Format varies based on configuration.	
	FAn 1 Fan 1 Speed Speed of fan 1 during time 1	Single Speed: **on**, **OFF** Two Speed: **OFF**, **Lo**, **HIGH**	
	StPt2 Set point 2 Temperature of set point 2.	Temp range low - temp range high	
	tiME2 Time 2 Run time of set point 2.	Format varies based on configuration.	
	FAn 2 Fan 2 Speed of fan during time 2	Single Speed: **on**, **OFF** Two Speed: **OFF**, **Lo**, **HIGH**	
	ProbE Probe Activates probe function.	**on**, **OFF**	
	PtEmP Probe Temperature Temperature at which probe will switch controller to hold condition.	Temp range low - temp range high	
	StPt3 Set point 3 Temperature of set point 3.	Temp range low - temp range high	
	tiME3 Time 3 Run time of set point 3.	Format varies based on configuration.	.
	FAn 3 Fan 3 Speed Speed of fan 3 during time 3	Single Speed: **on**, **OFF** Two Speed: **OFF**, **Lo**, **HIGH**	
	StPt4 Set point 4 Temperature of set point 4.	Temp range low - temp range high	
	tiME4 Time 4 Run time of set point 4.	Format varies based on configuration.	
	FAn 4 Fan 4 Speed of fan during time 4	Single Speed: **on**, **OFF** Two Speed: **OFF**, **Lo**, **HIGH**	

ALArn Mid Menu Alarm	nonE, Stir, Add, FLiP, turn, ALErt
AtinE Alarm Time Time before end of menu	0 - tiME (in seconds)
HStPt Hold Set Point Temperature at which the oven will operate during hold sequence	Temp range low to temp range high.
HtinE Hold Time Run time of hold sequence.	0 = infinite. A setting >0 = hold time. Format varies based on configuration
H FAn Hold Fan Speed of fan during hold time	Single speed: on, OFF Two Speed: OFF, Lo, HiGH

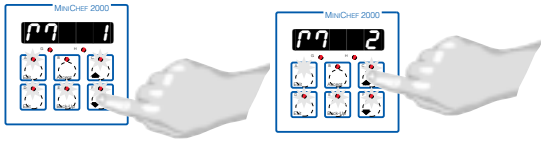
Procedure to program the menus

This procedure applies only to automatic applications. Menus for manual applications are explained in the application guides.

1. To enter the Program Mode, press the Up-arrow and Down-arrow keys simultaneously for approximately two seconds.

   rn 1 will appear on the display. This is menu number 1, the first in a list of several. You are now in the Program Mode.

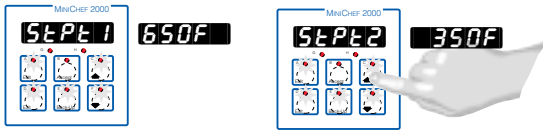
2. To move down the list of menus press the Down-arrow key. To move up, press the Up-arrow key.

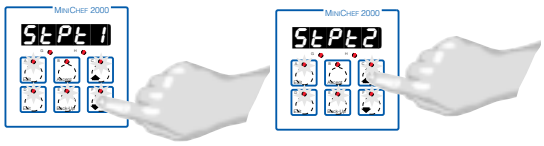
3. To access the list of menu parameters, with the appropriate menu number on the display, press the Edit key.

   The first in a list of parameters will appear on the display.

   The display will alternate between the parameter and its value.

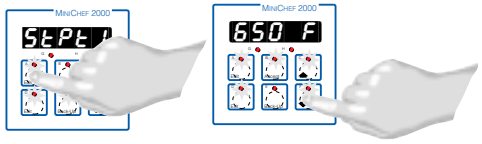
   

4. To move down the list of parameters press the Down-arrow key. To move up, press the Up-arrow key.

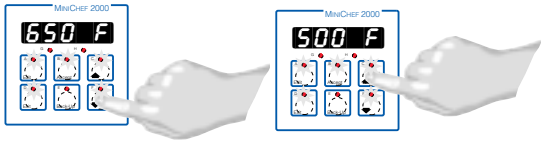
   

5. To edit a value: with the parameter on the display, press the Edit key.

   The first value in a list of values will appear on the display.



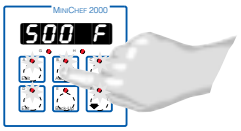
6. To change a value: press the Down-arrow key to move down, press the Up-arrow key to increment up.



7. To enter the new value: with the value on the display, press the Enter key.

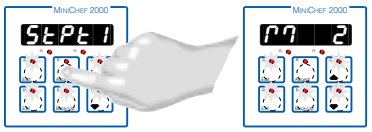
   The value will be entered and you will return to the parameter list.

   If you do not want to enter the new value, press the Escape key. You will return to the parameter list without making the change. The parameter and it's original value will alternate on the main display.

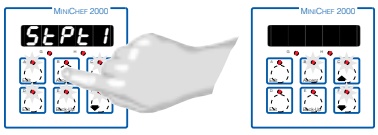


8. Repeat 2 through 7 until all values for the menu have been programmed.
9. To leave the parameter list, press the Enter key.

   You will move to the menu list.



10. Repeat 2 through 9 until all desired menus have been programmed. It is not required that all menus be programmed. (If any total menu time is set to zero, the menu key is disabled in the Operation Mode.)
11. To leave the menu list and exit the Program Mode, press the Enter key.



Note: A second way to immediately exit the Program Mode is to press the Home key for 2 seconds.

To Review Menu Values

Repeat 1 through 4 for each menu. Repeat 9 and 11 to exit.

Step 5 Set Controller Security

To Set Menu Security Lock

Return to the Configuration Mode, to the SEtuP Function, and program the Loc Parameter to adjust end-user access.

When Loc is set to YES the end user does not have access to the Menu Programming Mode and can only view parameter values.

When Loc is set to no the end user has access to the Menu Programming Mode and can change parameter values.

To return to the Operation Mode, press the Enter key twice.

To Set Application Number Security Lock

Return to the Configuration Mode, to the EtYPE Function, and the A_Loc Parameter to adjust end-user acess.

When A_Loc is set to YES the user cannot change the Application Number. The application number is secure from inadvertant changes.

When A_Loc is set to no the user can change the Application Number.

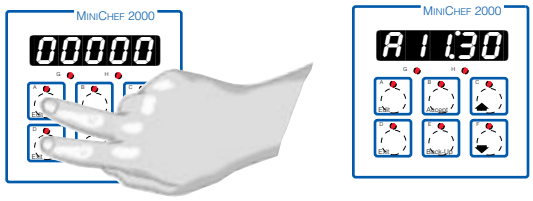
To return to the Operation Mode, press the Enter key twice.

Step 6 Set the Real-time Clock

These instructions are optional and apply only to controllers that are purchased with the Real-time clock (time of day) option. (Part number example: F2 _ _ - _ _ _ _ - 1 _ _ _)

To set the time of day

1. Press the Edit key and Home key simultaneously for approximately 3 seconds. You are now in the Real-time Clock Program Mode.



2. To change the time press the Up-arrow or Down-arrow key. Note that A indicates a.m. and P indicates p.m..

3. With the desired time on the display, press the Enter key. The new value will be saved and the unit will return to the Operation Mode.

Depending on how the controller was programmed in the Configuration Mode, one of the following will appear on the display:

Time of day (if SEtUP / CLoc is set to YES in the Configuration Mode).

or

idLE (if SEtUP / CLoc is set to no in the Configuration Mode).

Step 7 Design Membrane Overlay

In Step 7, design the membrane overlay for the front controller panel. Follow the design guidelines here, but for suggestions about designs suitable for specific applications, see the Suggested Overlay Design in each application guide.

1. Design guidelines

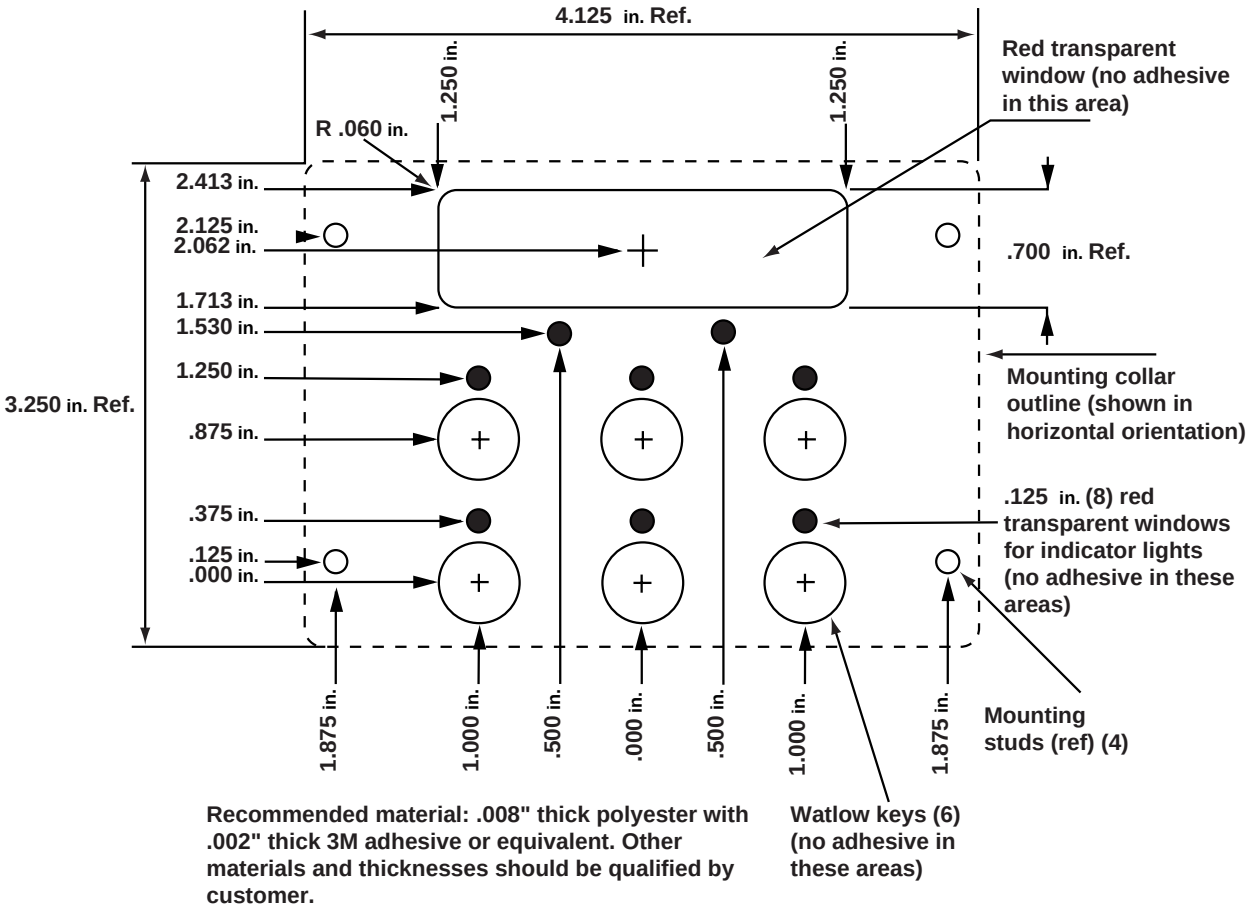


Figure 31 — Membrane guidelines for a horizontal unit.

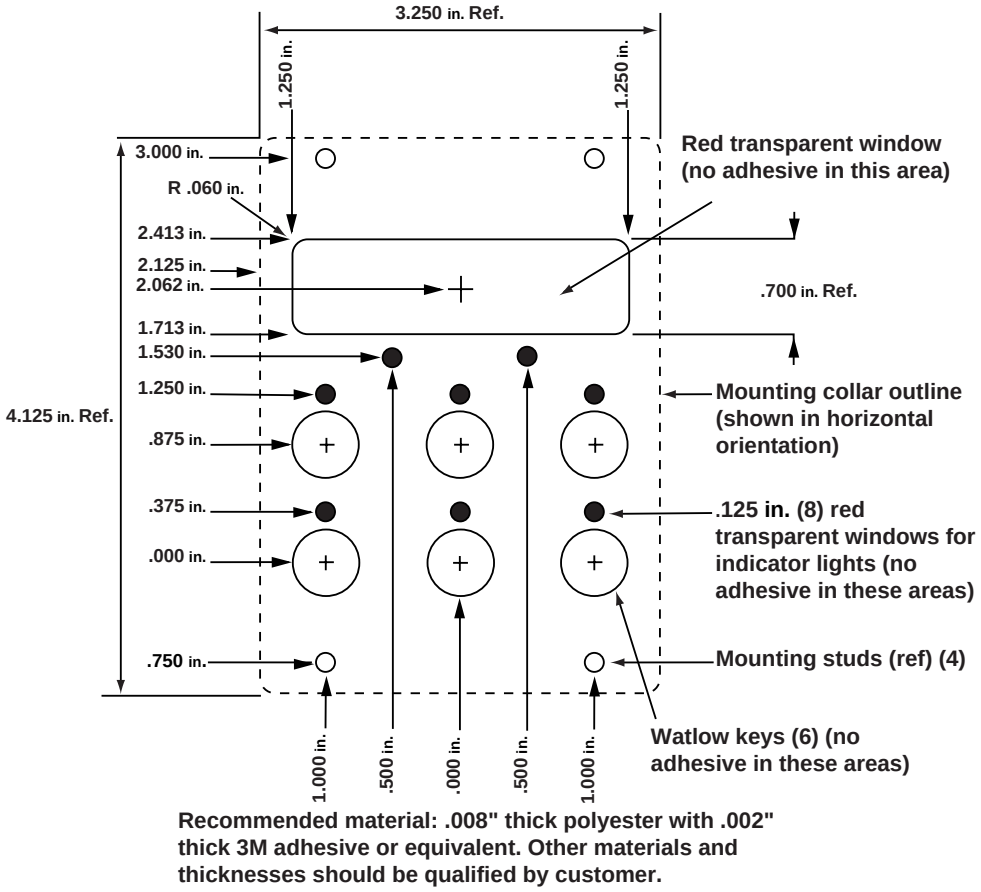


Figure 32 — Membrane guidelines for a vertical unit.

2. Recommended source of faceplate overlay supply:

Customers must supply their own faceplate membrane overlay. A recommended source of supply of contamination- and water-resistant overlays is Dura-Tech, Inc., La Crosse, Wis., Phone (608) 781-2570. FAX (608) 781-1730

3. A Prototyping and Training faceplate overlay accessory you can order:

The prototyping and training membrane faceplate (adhesive backed, measuring 4.75 in x 4.75 in) is available as an Accessory (WATLOW PART NO. 0238-0679-0000).

Appendix

Troubleshooting Chart 34
Definitions of Functions, Parameters, Values .44
Definitions of Alarms and Errors 55
Glossary of Terms 58
Specifications 60
Ordering Information 61
Warranty and Returns Policy 63
Index 64
Declaration of Conformity 66

MINICHEF™ 2000 Troubleshooting Chart

Symptom/Indication	Possible Causes	Possible Solutions
Main display is blank. No indicator lights.	• System power switch is off. • System fuse is blown. • System circuit breaker is tripped. • System high-limit device is latched. • System wiring has open circuitry. • Power supplied to controller does not meet specification.	• Check the controller mating connectors and system harness assemblies for proper installation. • Cycle the power to the controller: off-on. • Check power supply, fuses, switches, breakers, connectors, wiring for proper connection.
Errors (Messages 1-14 alternate on display with normal display.)*		
Err 1 appears on the display	• Controller EPROM component malfunction (checksum error).	• Cycle the power to the controller: off-on. If Err 1 reappears on the display, return controller to factory.
Err 2 appears on the display	• Controller EEPROM component malfunction (checksum error).	• Cycle the power to the controller: off-on. If Err 2 reappears on the display, return controller to factory.
Err 3 appears on the display	• Controller RAM memory malfunction.	• Cycle the power to the controller: off-on. If Err 3 reappears on the display, return controller to factory.
Err 4 appears on the display	• Calibration Error. Controller is out of calibration.	• Return controller to factory.
Err 5 appears on the display	• A/D Underflow Error has occurred on channel 1. • Temperature sensor for channel 1 is incompatible with controller. • Temperature sensor lead wires for channel 1 are improperly terminated (lead wires are reversed). • Channel 1 measures a condition below the controller temperature range.	• Confirm temperature sensor compatibility. Compare controller part number and specification to the chosen sensor. • Refer to the controller part number on the sticker label, or view the controller part number by accessing the WatHelp Diagnostics Function. • For controllers requiring thermocouple sensors, confirm that the tc parameter is set to the proper thermocouple curve. • For controllers requiring RTD sensors, confirm that the rtd parameter is set to the proper RTD curve. • Refer to sensor wiring instructions. • Refer to controller specifications.

***Note: For definitions of errors, see pages 56 - 57.**

Symptom/Indication	Possible Causes	Possible Solutions
Err 6 appears on the display	• A/D Overflow Error has occurred on channel 1. • Temperature sensor or circuit for channel 1 is open or damaged. • Temperature sensor for channel 1 is incompatible with controller. • Channel 1 measures a condition above the controller temperature range.	• Evaluate condition of channel 1 sensor and circuitry. • Confirm temperature sensor compatibility. Compare controller part number and specification to the chosen sensor. • Refer to the controller part number on the sticker label, or view the controller part number by accessing the WatHelp Diagnostics Function. • For controllers requiring thermocouple sensors, confirm that the tc parameter is set to the proper thermocouple curve. • For controllers requiring RTD sensors, confirm that the rtd parameter is set to the proper RTD curve. • Refer to sensor wiring instructions. • Refer to controller specifications.
Err 7 appears on the display	• Under-range Error has occurred on channel 1. • Controller measures a temperature below the allowable operating range. • Temperature sensor lead wires for channel 1 are improperly terminated (lead wires are reversed). • Controller is misapplied.	• Refer to sensor wiring instructions. • Refer to controller specifications. • System may need to warm up.
Err 8 appears on the display	• Over-range Error has occurred on channel 1. • Controller measures a temperature above the allowable operating range. • Temperature sensor lead wires for channel 1 are improperly terminated (lead wires are reversed). • Controller is misapplied.	• Refer to sensor wiring instructions. • Refer to controller specifications. • System may need to cool down. • Evaluate the system high-temperature limiting device.

Symptom/Indication	Possible Causes	Possible Solutions
Err 9 appears on the display	• A/D Underflow Error has occurred on channel 2. • Temperature sensor for channel 2 is incompatible with controller. • Temperature sensor lead wires for channel 2 are improperly terminated (lead wires are reversed). • Channel 2 measures a condition below the controller temperature range.	• Confirm temperature sensor compatibility. Compare controller part number and specification to the chosen sensor. • Refer to the controller part number on the sticker label, or view the controller part number by accessing the WatHelp Diagnostics Function. • For controllers requiring thermocouple sensors, confirm that the tc parameter is set to the proper thermocouple curve. • For controllers requiring RTD sensors, confirm that the rtd parameter is set to the proper RTD curve. • Refer to sensor wiring instructions. • Refer to controller specifications.
Err 10 appears on the display	• A/D Overflow Error has occurred on channel 2. • Temperature sensor or circuit for channel 2 is open or damaged. • Temperature sensor for channel 2 is incompatible with controller. • Channel 2 measures a condition above the controller temperature range.	• Evaluate condition of channel 2 sensor and circuitry. • Confirm temperature sensor compatibility. Compare controller part number and specification to the chosen sensor. • Refer to the controller part number on the sticker label, or view the controller part number by accessing the WatHelp Diagnostics Function. • For controllers requiring thermocouple sensors, confirm that the tc parameter is set to the proper thermocouple curve. • For controllers requiring RTD sensors, confirm that the rtd parameter is set to the proper RTD curve. • Refer to sensor wiring instructions. • Refer to controller specifications.
Err 11 appears on the display	• Under-range Error has occurred on channel 2. • Controller measures a temperature below the allowable operating range. • Temperature sensor lead wires for channel 2 are improperly terminated (lead wires are reversed). • Controller is misapplied.	• Refer to sensor wiring instructions. • Refer to controller specifications. • System may need to warm up.

Note: For definitions of errors, see pages 56 - 57.

Symptom/Indication	Possible Causes	Possible Solutions
Err 12 appears on the display	• Over-range Error has occurred on channel 2. • Controller measures a temperature above the allowable operating range. • Temperature sensor lead wires for channel 2 are improperly terminated (lead wires are reversed). • Controller is misapplied.	• Refer to sensor wiring instructions. • Refer to controller specifications. • System may need to cool down. • Evaluate the system high-temperature limiting device.
Err 13 appears on the display	• Ambient temperature surrounding the controller is too high or too low.	• Adjust system or environment such that the ambient air surrounding the control is above 0°C and below 80°C. • Refer to controller specifications.
Err 14 briefly appears on the display when power is turned on. Time of day no longer appears on the display. The word idLE or some other word appears on the display.	• Real-time Clock Error prohibits the time of day to appear on the display.	• If the application does not require the Power Loss Menu Resume feature, then this error is a non-critical error. The controller will operate normally, with the exception of no longer displaying the time of day. To correct the error, return controller to the factory. • If the application requires displaying time of day, or if the application requires the Power Loss Menu Resume feature, then this error is a critical error. Return controller to the factory.
Time of day does not appear on the display. The word idLE or some other word appears on the display when power is turned on.	• Controller is not equipped with the Real-time Clock option. • Controller is equipped with the Real-time Clock option, but the controller is not programmed properly.	• Compare controller part number to the following part number format: F2HA-_ _ _ _ - 1 _ _ _. • If the controller part number does not have a “1” in the 9th position, it is not equipped for the Real-time Clock (time of day) feature. Refer to the controller part number on the sticker label, or view the controller part number by accessing the WatHelp Diagnostics Function. • Confirm that the CLoc parameter is set to YES.

Symptom/Indication	Possible Causes	Possible Solutions
Alarms		
PrOC1 appears on the display. System seems to be overheating.	Absolute Process Alarm for channel 1 has occurred. • Channel 1 temperature sensor measures a value that exceeds the maximum allowable temperature defined by the program. • System equipment failure.	• Determine if Absolute Process Alarm is required for channel 1. If not, access the AL 1 parameter and set the value to disable the process alarm, choosing none or dEU. Refer to programming guide. • If Process Alarm for channel 1 is required, confirm that the AL P1 parameter is set to the proper value for the application. • Evaluate the system high-temperature limiting device. • The Offset parameter can affect the alarm point. Confirm that the OFSt1 parameter is set properly. • System may require service.
PrOC2 appears on the display. System seems to be overheating.	Absolute Process Alarm for channel 2 has occurred. • Channel 2 temperature sensor measures a value that exceeds the maximum allowable temperature defined by the program. • System equipment failure.	• Determine if Absolute Process Alarm is required for channel 2. If not, access the AL 2 parameter and set the value to disable the process alarm, choosing none or dEU. Refer to programming guide. • If Process Alarm for channel 2 is required, confirm that the AL P2 parameter is set to the proper value for the application. • Evaluate the system high-temperature limiting device. • The Offset parameter can affect the alarm point. Confirm that the OFSt2 parameter is set properly. • System may require service.

Note: See definitions of temperature alarms on page 55.

Symptom/Indication	Possible Causes	Possible Solutions
H.1 appears on the display. System seems to be overheating.	Deviation Alarm indicating a high temperature condition for channel 1. • Channel 1 sensor measures a high temperature that exceeds the allowable deviation above the programmed setpoint.	• Determine if High or Low Deviation Alarms are required for channel 1. If neither are required, access the AL1 parameter and set the value to disable the deviation alarms, choosing none or Proc. Refer to programming guide. • If Deviation Alarms for channel 1 are required, confirm that the ALdH1 parameter is set to the proper value for the application. • The Offset parameter can affect the alarm point. Confirm that the OFSt1 parameter is set properly. • System may require service.
H.2 appears on the display. System seems to be overheating.	Deviation Alarm indicating a high temperature condition for channel 2. • Channel 2 sensor measures a high temperature that exceeds the allowable deviation above the programmed setpoint.	• Determine if High or Low Deviation Alarms are required for channel 2. If neither are required, access the AL2 parameter and set the value to disable the deviation alarms, choosing none or Proc. Refer to programming guide. • If Deviation Alarms for channel 2 are required, confirm that the ALdH2 parameter is set to the proper value for the application. • The Offset parameter can affect the alarm point. Confirm that the OFSt2 parameter is set properly. • System may require service.
LO.1 appears on the display. System seems to be underheating.	Deviation Alarm indicating a low temperature condition for channel 1. • Channel 1 sensor measures a low temperature that exceeds the allowable deviation below the programmed setpoint.	• Determine if High or Low Deviation Alarms are required for channel 1. If neither are required, access the AL1 parameter and set the value to disable the deviation alarms, choosing none or Proc. Refer to programming guide. • If Deviation Alarms for channel 1 are required, confirm that the ALdL1 parameter is set to the proper value for the application. • The Offset parameter can affect the alarm point. Confirm that the OFSt1 parameter is set properly. • System may require service.

Symptom/Indication	Possible Causes	Possible Solutions
LO 2 appears on the display. System seems to be underheating.	Deviation Alarm indicating a low temperature condition for channel 2. • Channel 2 sensor measures a low temperature that exceeds the allowable deviation below the programmed setpoint.	• Determine if High or Low Deviation Alarms are required for channel 2. If neither are required, access the AL 2 parameter and set the value to disable the deviation alarms, choosing nonE or Proc. Refer to programming guide. • If Deviation Alarms for channel 2 are required, confirm that the ALdL2 parameter is set to the proper value for the application. • The Offset parameter can affect the alarm point. Confirm that the OFSt2 parameter is set properly. • System may require service.
Operations		
• Operator cannot access Menu Programming Mode. • Operator cannot access Configuration Mode. • Operator cannot set Real-time Clock time.	• Controller is currently running a menu. • Operator error. • Controller does not have the Real-time Clock option.	• Access modes when controller is in an idle state. User can cancel an active menu in order to gain access to these modes. • Refer to programming guide for procedure to access the Menu Programming Mode, the Configuration Mode and for setting the Real-time Clock time.
Cannot stop an active menu.	Operator error.	Press Menu key or Start/Stop key for 2 seconds.
Alarm sound is on too long or runs continuously at the end of a Menu cycle. Different Alarm sound or duration is desired at the end of a Menu cycle.	• Operator error. • Sound parameter is set to S. • Controller requires reprogramming.	• To silence the alarm, press the key indicated by the flashing light. • To select alternative Audible Alarm sounds and duration, change value of Sound parameter to meet the application requirements. See programming guide. • Consult factory.
Scrambled display	• Temporary error. • Controller is defective.	• Turn power off, then on to clear the temporary error. • If error persists, return to factory.
Keys seem to function differently than expected.	• Controller programmed incorrectly for application. • Factory applied wrong faceplate overlay to system. • Operator error. • Defective key switch.	• Verify the correct software Application Number is programmed. Access WatHelp Diagnostics and make note of APPL parameter value. • Refer to programming guide. • Consult factory.

Note: See definitions of temperature alarms on page 55.

Symptom/Indication	Possible Causes	Possible Solutions
Keys inoperative or hard to press.	• Misalignment of controller to metal faceplate. • Menu key is inactive due to programmed menu time set to zero. • Operator error. • Defective key switch.	• Ensure proper mounting of controller. • If Menu key is inoperative, verify that a time greater than zero is programmed into the Menu program for that key. • Refer to the programming guide. Consult factory. • Return to factory.
Faceplate Overlay is damaged or cracked. Edges are lifting up.	• Faceplate overlay not designed or installed properly.	• Contact factory to replace faceplate overlay to avoid contamination of controller electronics. If overlay is damaged, take extreme care when cleaning area around controller. Do not wash, wipe, or spray damaged area with liquid cleansers. • Refer to Faceplate Overlay design guidelines.
Controller does not beep: • when keys are pressed. • at the end of Menu cycles.	• Specified system does not have an audible alarm output or the audible alarm is defective. • The Key Chirp feature is not activated. • The Sound parameter value is set to 0.	If controller part number format is F2XX-XXXX-X1XX (a “1” in the tenth character) and if the ChirP parameter is set to on: • If keys don't beep, return controller to factory. If no audible alarm occurs at the end of a Menu cycle, and if Sound parameter is set to a number other than 0: • return the controller to the factory. If controller part number format is F2HA - _ _ _ _ - _0 _ _ (a “0” in the tenth character), consult factory.
• Controller beeps every time a key is pressed.	•The Key Chirp feature is activated.	• Disable the Key Chirp feature by setting the ChirP parameter to OFF.
Menus cycles don't resume (continue) after power returns to the controller. Power Loss Menu Resume feature doesn't seem to work.	• Controller configuration does not have Battery/Real-time Clock feature. • The Power Loss Menu Resume feature is not activated. • Battery is low or needs replacement.	• Confirm that the controller configuration has the Battery/Real-time Clock feature. Part number format is F2HA - _ _ _ _ - 1 _ _ _ (a “1” in the ninth character). • Reprogram the controller, setting the PLOSS parameter to YES. • If problem persists, return controller to factory.

Symptom/Indication	Possible Causes	Possible Solutions
Time of day is inaccurate	• Real-time Clock is not programmed properly. • Battery is low.	• Refer to programming guide to reset the time of day. • If problem persists, return to factory.
Programmed Menus are being changed or tampered with.	Menu Program Security has not been set.	To secure the Menu programs, set the Loc parameter to YES.
Software Application Numbers are being changed or tampered with.	Application Number Security has not been set.	To secure the Application Number, set the A_Loc parameter to YES.
Operator cannot reprogram Menus.	Menu Program Security has been set.	Set the Loc parameter to no.
Software Application Number cannot be changed.	Application Number Security has been set.	Set the A_Loc parameter to no.
Inaccurate temperatures	Malfunctioning temperature sensors. • OFSt1 or OFSt2 parameter may be set incorrectly. • System may have two grounded thermocouple sensors, causing ground loops. • Loose or improper connections. • Reversed sensor lead-wires. • Sensor not compatible with control. • Control not programmed properly.	• Refer to Troubleshooting section on Error Messages. • Confirm that compatible sensors are used in the system. Refer to controller specifications. • Check system wiring. • Check system sensors. • Confirm that a maximum of 1 grounded thermocouple is used in the system. • Confirm that compatible thermocouple wires/extension wires are used in the system. • Verify that the programmed thermocouple curve matches the sensor specification (see tc parameter setting. • Verify that the programmed RTD curve matches the sensor specification (see rtd parameter setting) • Use WatHelp Diagnostics parameter tEMP1 and tEMP2 to confirm actual temperatures sensed on channel 1 and 2.
Operator cannot get out of Configuration Mode or Menu Programming Mode.	Operator error.	• Press the HOME key for 2 seconds. • Or, repeatedly press the ENTER key to exit and return to the normal operating mode.

Symptom/Indication	Possible Causes	Possible Solutions
Cannot change the value of a parameter while in the Configuration Mode.	Operator error.	• View the parameter name on the display. Display should be flashing. Press the EDIT key first, before using the UP and DOWN keys. • If attempting to set the software application number (APPL), the Application Number Security Lock may be set; set the A_Loc parameter to no.
Cannot change the value of a Menu Parameter while in the Menu Programming Mode.	Operator error.	• View the parameter name on the display. Press the EDIT key first, before using the UP and DOWN keys. • Menu Program Security Lock may be set; set the Loc parameter to no.

Definitions of Functions, Parameters and Values

Configuration Mode

EtYPE Equipment Type Function
Configures control for application and sounds.

APPL Application Number
Selects the application software set for the controller.
Range: 1-20 **Default:** 20

A_Loc Application Number Security Lock
Choose between YES and no to lock the Application Number. When A_Loc is set to YES, the Application Number is not adjustable.
Range: YES, no **Default**: no

Pt inE Pressure Release Time
Sets the number of seconds before the completion of a menu when the pressure output is released.
Range: 1-120 sec. **Default:** 60

Sound Audible Alarm Sound
Type of audible alarm that will sound at the completion of a menu cycle or at the end of a hold cycle.
Range: 0-5 **Default:** 0
0 = no alarm sound at the end of menu
1 = alarm sounded for 2 seconds
2 = alarm sound alternatives on/off every second for 20 seconds
3 = 3 short beeps followed by 1 second off, this cycle repeats itself for 20 seconds
4 = alarm sounds on/off every second continuously
5 = alarm is on solid, continuously

Note: All alarms can be silenced by pressing the appropriate key once.

bt inE Basket Travel Time
This is the number of seconds that the output for basket lift/drop will be on. This prompt is only visible on applications with automatic basket lift.
Range: 0 - 30 seconds **Default:** 2 seconds

PrEHt Preheat Temperature
The temperature that the control will preheat to upon power-up. This prompt is only visible on some deep fat fryer applications.
Range: temp range low - range high **Default:** temperature range low

idLE 1 Idle Temperature Number 1
This is the effective setpoint when you press the idle one key. This idle setpoint can only be regulated to during the idle state.
Range: temp range low - range high **Default:** temperature range low

idLE2 Idle Temperature Number 2
This is the effective setpoint when you press the idle two key. This idle setpoint can only be regulated to during the idle state.
Range: temp range low - range high **Default:** temperature range low

oMELt Oil Melt Cycle
Turns the melt feature on or off. This feature will allow the heaters to come on at only 10% power when the temperature is below 212°F. This is visible on all deepfat fryer applications.
Range: on, OFF **Default:** OFF

FAn Fan Speed
This selects the fan type, either 1 speed, on/off, or two speed, off/lo/hi. This prompt is visible on convection ovens with a fan.
Range: 1-speed, 2-speed **Default:** 1-speed

dELAY Fan Delay Time
Selects the amount of time in minutes, after completion of a menu, that the fan will remain on for system cooling. This prompt is visible on convection ovens with a fan.
Range: 0 - 120 minutes **Default:** 0 minutes

SEtPt Set Point Temperature
Set point that the control will regulate to at all times. Visible on applications that have one setpoint for all menus.
Range: trLo to trHi **Default:** trLo

t OUt Timer Output 4
Selects if event output will turn on while time is running. Visible on manual applications with output 4 available
Range: YES, no **Default:** no

StEPS Number of Cooking Steps
Selects number of steps in the menu. Visible on manual applications with two possible steps.
Range: 1, 2 **Default:** 1

ProbE Probe
Selects if application will use a meat/food temperature probe to measure temperature, initiated by a press of the probe key. Visible on rotisserie applications.
Range: YES, no **Default:** no

SEtUP Setup Function
Sets up control for hardware and operating parameters

C_F Temperature Display Format
Selects the units of temperature measurement, either Fahrenheit or Centigrade. This parameter appears only when the selected application software set uses at least one temperature input or output.
Range: C, F **Default:** F

Setup Function, continued

tiME Time Display Format
Selects the time display format in minutes/seconds, hours/minutes, or hours/ minutes/ seconds and will only appear when the selected application software set uses time for any of its operations.
Range: mmSS HHmm HmmSS **Default:** HmmSS

ChirP Key Chirp
Turns the key chirp function on or off. The key chirp function makes a short audible sound whenever a valid keypress has been made.
Range: on, OFF **Default:** OFF

Loc Menu Security Lock
Choose between YES and no to lock the menu parameters. When Loc is set to YES, the menu parameters are not adjustable. This parameter only appears when the selected application software set has pre-programmed or saved menus.
Range: YES, no **Default:** no

tc Thermocouple Type
Selects the type of thermocouple sensor used. Both thermocouple inputs must be of the same type when using two. This parameter appears only when the control has thermocouple type inputs and the selected application software set uses at least one temperature input.
Range: J, H, E **Default:** J
Note: H **denotes type K thermocouple.**

rtd RTD Curve
Selects the RTD (resistance temperature detector) curve. When utilizing two RTD inputs, both must use the same curve. This parameter only appears when the control has RTD type inputs and the selected application software set uses at least one temperature input.
Range: din, JIS **Default:** din

tconP WatCurve Temperature Compensation
Turns the WatCurve temperature compensation feature on or off. This parameter appears only when the selected application software set uses at least one temperature output in combination with a count down timer.
Range: on, OFF **Default:** OFF

OFSt1 Temperature Offset, Channel 1
Adds a relative offset to the sensed temperature of input 1. This parameter appears only when the selected application software set uses temperature input 1.
Range: -99 to 99ºF (-55 to 55ºC) **Default:** 0

OFSt2 Temperature Offset, Channel 2
Adds a relative offset to the sensed temperature of input 2. This parameter appears only when the selected application software set uses temperature input 2.
Range: -99 to 99ºF (-55 to 55ºC) **Default:** 0

tr Lo Temperature Range Low
Sets an absolute lowest setable temperature set point. This parameter appears only when the selected application software set uses at least one temperature output.
Range: 0ºF (-18ºC) for rtd inputs, 32ºF (0ºC) for tc inputs to the value of **tr Hi**
Default: 32ºF

tr Hi Temperature Range High
Sets an absolute highest setable temperature set point. This parameter appears only when the selected application software set uses at least one temperature output.
Range: value of **tr Lo** to 1200ºF (649ºC) **Default:** 500ºF(260ºC)

rEAdy Ready/Preheat Feature
Turns the ready band feature on or off. Visible if application uses at least on temperature input. If this feature is activated, the controller displays temperature as the system pre-heats to the “ready “condition.
Range: **YES**, **no** **Default:** **YES**

rbAnd Ready Band
This feature is used along with the Ready/Preheat feature. Ready Band sets the ready band size. The ready band is the current set point +/- the relative temperature value of **rbAnd**. The use of ready band varies with the application software set. This parameter only appears when **rEAdy** is set to yes.
Range: 1 to 1200ºF (649ºC) **Default:** 100ºF (56ºC)

CLoc Real-time Clock Display
Turns the real time clock feature on or off. When on, the control will display the time of day when it is idle. This parameter only appears when the hardware and the selected application software set support real-time clock option.
Range: **YES**, **no** **Default:** **no**

PLOSS Power Loss Menu Resume
Turns the power loss feature on or off. This parameter only appears when the hardware supports the real time clock and the selected application software set uses temperature input 1. If activated, menu countdown time resumes when power is returned to the system.
Range: **YES**, **no** **Default:** **no**

AL 1 Alarm, Channel 1
Selects the type of temperature alarm associated with input 1. This parameter only appears when the selected application software set uses temperature input 1.
Range: **nonE**, **dEU**, **Proc**, **both** **Default:** **nonE**

AL P1 Absolute Process Alarm 1, Channel 1
Sets an absolute process alarm temperature setting. A process alarm occurs when the input 1 temperature (including offset) is above this setting. This parameter only appears when the selected application software set uses temperature input 1 and **AL 1** is set to either **Proc** or **both**.
Range: 100ºF to 1200ºF (38 to 649ºC) **Default:** 1200ºF (649ºC)

Setup Function, continued

AL dL 1 Low Deviation Alarm, Channel 1
Sets a relative low deviation temperature alarm. A low deviation alarm occurs when the input 1 temperature (including offset) is below set point minus this setting. This parameter only appears when the selected application software set uses temperature input 1 and AL 1 is set to either dEv or both.
Range: -999 to 0ºF (-555 to 0ºC) **Default:** -999ºF (-555ºC)

AL dH 1 High Deviation Alarm, Channel 1
Sets a relative high deviation temperature alarm setting. A high deviation alarm occurs when the input 1 temperature (including offset) is above setpoint plus this setting. This parameter only appears when the selected application software set uses temperature input 1 and AL 1 is set to either dEv or both.
Range: 0 to 999ºF (0 to 555ºC) **Default:** 999ºF (555ºC)

AL 2 Alarm, Channel 2
Selects the type of temperature alarm associated with input 2. This parameter only appears when the selected application software set uses temperature input 2.
Range: nonE, dEv, Proc, both **Default:** nonE

AL P2 Absolute Process Alarm, Channel 2
Sets an absolute process alarm temperature setting. A process alarm occurs when the input 2 temperature (including offset) is above this setting. This parameter only appears when the selected application software set uses temperature input 2 and AL 2 is set to either Proc or both.
Range: 100 to 1200ºF (38 to 649ºC) **Default:** 1200ºF(649ºC)

AL dL2 Low Deviation Alarm, Channel 2
Sets a relative low deviation temperature alarm setting. A low deviation alarm occurs when the input 2 temperature (including offset) is below set point minus this setting. This parameter only appears when the selected application software set uses temperature input 2 and AL 2 is set to either dEv or both.
Range: -999 to 0ºF (-555 to 0ºC) **Default:** -999ºF (-555ºC)

AL dH2 High Deviation Alarm, Channel 2
Sets a relative high deviation temperature alarm setting. A high deviation alarm occurs when the input 2 temperature (including offset) is above set point plus this setting. This parameter only appears when the selected application software set uses temperature input 2 and AL 2 is set to either dEv or both.
Range: 0 to 999º F (0 to 555º C) **Default:** 999º F (555º C)

tHErL Thermal Function
Configures control heat functions

tYPE Temperature Control Type.
Selects the heat control algorithm. On/Off control uses a hysteresis as a switching point. PID control uses a combination of proportion, integral and derivative values to determine percentage of output power. This parameter only appears when the selected application software set uses at least one temperature output.
Range: PId, onOFF **Default:** onOFF

HYSt 1 Channel 1 Hysteresis
Sets the relative switching hysteresis size for output 1. This parameter only appears when the selected application software set uses a temperature output from channel 1 and tYPE is set to onOFF.
Range: 1 to 99ºF / 1 to 55ºC **Default**: 3ºF / 2ºC

HYSt2 Channel 2 Hysteresis
Sets the relative switching hysteresis size for output 1. This parameter only appears when the selected application software set uses a temperature output from channel 1 and tYPE is set to onOFF.
Range: 1 to 99ºF (1 to 55ºC) **Default**: 3ºF (2ºC)

Pid U Units
Selects the PID in US or SI (System International or metric) units.
Range: SI, US **Default:** US

tunE 1 Channel 1 Auto-tune
Initiates the auto-tuning feature for output 1. This parameter only appears when the selected application software set uses a temperature output from channel 1 and tYPE is set to Pid.
Range: On, OFF **Default**: OFF

tunE2 Channel 2 Auto-tune
Initiates the auto-tuning feature for output 2. This parameter only appears when the selected application software set uses a temperature output from channel 2 and tYPE is set to Pid.
Range: On, OFF **Default**: OFF

ProP 1 Channel 1 Proportional Band
Sets the proportional band for output 1. This parameter only appears when the selected application software set uses a temperature output from channel 1 and tYPE is set to Pid.
Range: 1 to 999ºF (1 to 555ºC) **Default**: 25ºF (14ºC)

rSEt 1 Channel 1 Reset
Sets the reset (integral) gain for output 1. A value of 0.00 shuts reset off. This parameter only appears when the selected application software set uses a temperature output from channel 1 and tYPE is set to Pid and Pid U is set to US.
Range: 0.00 to 9.99 repeats / minute **Default**: 0.00 repeats / minute

int 1 Channel 1 Integer
Sets the integral gain for output 1. A value of 0.00 shuts the integral off. This parameter only appears when the selected application software set uses a temperature output from channel 1 and tYPE is set to Pid and Pid U is set to SI.
Range: 0.00 to 99.99 minutes / repeat **Default**: 0.00 minutes / repeat

rAtE 1 Channel 1 Rate
Sets the rate (derivative) gain for output 1. A value of 0.00 shuts the rate off. This parameter only appears when the selected application software set uses temperature output 1 and tYPE is set to Pid and Pid U is set to US.
Range: 0.00 to 9.99 minutes **Default**: 0.00 minutes

Thermal Function, continued

dEr 1 Channel 1 Derivative
Sets the derivative gain for ot 1. A value of 0.00 shuts the derivative off. This parameter appears when the selected application software set uses temperature output 1 and tYPE is set to PId and PId U is set to tIME.
Range: 0.00 to 9.99 minutes **Default**: 0.00 minutes

CYcL 1 Channel 1 Cycle Time
Sets the PID cycle time for output 1. This parameter only appears when the selected application software set uses temperature output 1 and tYPE is set to PId.
Range: 1 to 60 seconds **Default**: 5 seconds

ProP2 Channel 2 Proportional Band
Sets the relative proportional band for output 2. This parameter only appears when the selected application software set uses temperature output 2 and tYPE is set to PId.
Range: 1 to 999ºF (1 to 555ºC) **Default**: 25ºF (14ºC)

rSEt2 Channel 2 Reset
Sets the reset (integral) gain for output 2. A value of 0.00 shuts reset off. This parameter only appears when the selected application software set uses a temperature output from channel 2 and tYPE is set to PId and PId U is set to rEPS.
Range: 0.00 to 9.99 repeats / minute **Default**: 0.00 repeats / minute

int 2 Channel 2 Integer
Sets the integral gain for output 2. A value of 0.00 shuts the integral off. This parameter only appears when the selected application software set uses a temperature output from channel 2 and tYPE is set to PId and PId U is set to tIME. **Range**: 0.00 to 99.99 minutes / repeat **Default**: 0.00 minutes / repeat

rAtE2 Channel 2 Rate
Sets the rate (derivative) gain for output 2. A value of 0.00 shuts the rate off. This parameter only appears when the selected application software set uses temperature output 2 and tYPE is set to PId and PId U is set to rEPS.
Range: 0.00 to 9.99 minutes **Default**: 0.00 minutes

dEr 2 Channel 2 Derivative
Sets the derivative gain for output 2. A value of 0.00 shuts the derivative off. This parameter appears when the selected application software set uses temperature output 2 and tYPE is set to PId and PId U is set to tIME.
Range: 0.00 to 9.99 minutes **Default**: 0.00 minutes

CYcL2 Channel 2 Cycle Time
Sets the PID cycle time for output 2. This parameter only appears when the selected application software set uses temperature output 2 and tYPE is set to PId.
Range: 1 to 60 seconds **Default**: 5 seconds

diAG WatHelp Diagnostics Function
Allows the viewing of information that is useful when servicing or troubleshooting the system.

dAtE Date-of-Manufacture Code
Shows the manufactured date code of the controller.
Cannot be changed.

SEr n Serial Number
Shows the serial number of the controller.
Cannot be changed.

PArt1 Part Number 1
Shows the first four characters of the controller part number.
Cannot be changed.

PArt2 Part Number 2
Shows the second four characters of the controller part number.
Cannot be changed.

PArt3 Part Number 3
Shows the third four characters of the controller part number.
Cannot be changed.

S rEV Software Revision Number
Displays the software revision number for the controller.
Cannot be changed.

APPL Application
Displays the application software set for the control.
Range: 1-28 **Default:** 20

idEnt Key Function Identification.
Setting to YES will activate a review of the function of the keys. The key indicators will light and the corresponding key function will appear in the display.
Range: Yes, no

88888 Display Test
Lights up all display and individual LED`s for verification that they work properly.
Visual test only. Cannot be changed.

OutPt Output Test
To assist in system troubleshooting, forces on each output for verification that all outputs work. Outputs return to normal when OutPt parameter is set to 0 or the user exits the OutPt test.
Range: 0-6 **Default**: 0
0=all outputs are in a normal state
1=only Output 1 is on
2=only Output 2 is on
3=only Event Output 1 is on
4=only Event Output 2 is on
5=only Output 5 is on
6=all outputs are on

Diagnostics Function, continued

inPut Event Input Test
To assist in system troubleshooting,shows the on/off state of the event inputs. A number alternatelyappears on the display.
If number =0, both inputs are open
If number =1, input 1 is closed, input 2 is open
If number =2, input 1 is open and input 2 is closed
If number =3, both inputs are closed

tEMP1 Channel 1 Input
Shows the input 1 temperature, with no offset added.

tEMP2 Channel 2 Input
Shows the input 2 temperature, with no offset added.

Program Mode

mENU 1 Menu Number
The number of the menu to program.
Range: 1 - x (The total number of menus depends on the application.) **Default:** 1

StPt 1 Set Point 1
This is the first cook set point temperature.
Range: Minimum and maximum temperatures programmed in the Configuration Mode
Default: range low

tiME 1 Time
This is the first cook time.
Range: depends upon time format, other time settings, and end application **Default:** 0

FAn 1 Fan
This is the first fan setting.
Range: On, OFF, Lo, Hi **Default:** OFF

StPt2 Set Point 2
This is the second cook set point temperature.
Range: range low to range high **Default:** range low

tiME2 Time 2
This is the second cook time.
Range: depends upon time format, other time settings, and end application **Default:** 0

FAn 2 Fan 2
This is the second fan setting.
Range: On, OFF, Lo, Hi **Default:** OFF

ProbE Probe
This turns the meat/food probe on or off for the current menu.
Range: On or OFF **Default:** OFF

PtEmP Probe Temperature
This is the probe temperature setting.
Range: range low to range high **Default:** range low

HStPt Hold Set Point
This is the hold setpoint temperature.
Range: range low to range high **Default:** range low

Ht iME Hold Time
This is the hold time.
Range: depends upon time format, other time settings, and end application. **Default:** 0

H FAn Hold Fan
This is the hold fan setting.
Range: on, OFF, Lo, Hi **Default:** OFF

Program Mode, continued

StPt3 Set Point 3
This is the third cook set point temperature.
Range: range low to range high **Default:** range low

tinE3 Time 3
This is the third cook time.
Range: depends upon time format, other time settings, and end application **Default:** 0

FAn 3 Fan 3
This is the third fan setting.
Range: On, OFF, Lo, Hi **Default:** OFF

StPt4 Set Point 4
This is the fourth cook set point temperature.
Range: range low to range high **Default:** range low

tinE4 Time 4
This is the fourth cook time.
Range: depends upon time format, other time settings, and end application **Default:** 0

FAn 4 Fan 4
This is the fourth fan setting.
Range: On, OFF, Lo, Hi **Default:** OFF

ALArn Mid Menu Alarm
Mid Menu Alarms are advisory alarms only and do not affect the controllability of the system. This parameter offers a choice of words that appears on the display during the Mid Menu Alarm Condition. These alarms silence automatically after a few seconds.
Range: none, stir, add, flip, turn, alert **Default:** none

AtinE Mid Menu Alarm Time
As a menu is activated and time is counting down to zero, the Mid Menu Alarm Time is the amount of time remaining in the countdown sequence at which time the Mid Menu Alarms sound and display.
Range: 0 - tine1 **Default:** 0

Definitions of Temperature Alarms

If there is a problem during operation, an alarm message will appear on the main display. Alarm messages are self clearing. They will go away when the condition causing the alarm goes away.

Only one alarm will be displayed at a time. The alarm with the highest priority will be the one displayed. The priority is as follows starting with the highest: channel 1 process, channel 1 high deviation, channel 1 low deviation, channel 2 process, channel 2 high deviation, channel 2 low deviation.

When displaying alarms, an alarm message will alternate with the normal display. Alarms will only be displayed in the operational mode. The outputs of the control will not be affected in any way by an alarm.

Process alarm PrOC1 (channel 1), PrOC2 (channel 2)

A process alarm occurs when the measured temperature of a channel exceeds the process alarm parameter value. The measured temperature includes any offsets programmed in the control parameters.

Low deviation alarm LO 1 (channel 1), LO 2 (channel 2)

A low deviation alarm occurs when the measured temperature of a channel drops below the current setpoint minus the low deviation parameter value. The measured temperature includes any offsets programmed in the control parameters.

High deviation alarm H, 1 (channel 1), H, 2 (channel 2)

A high deviation alarm occurs when the measured temperature of a channel rises above the current setpoint plus the high deviation parameter value. The measured temperature includes any offsets programmed in the control parameters.

Note: See the Troubleshooting Chart in this Appendix for probable causes and possible solutions to alarm situations.

Definitions of Errors

This control has the ability to detect different error conditions.

The outputs of the control will be shut off when any error condition occurs. If a menu is running, it will be canceled upon any error condition.

Only one error will be displayed at a time. The error with the highest priority will be the one displayed. When displaying errors, an error message will alternate with the normal display. Errors will only be displayed in the operational mode.

Errors Err 1, Err 2 and Err 3 are latching, meaning that once they occur, the only way to clear them is to cycle power. The remaining errors are self-clearing, meaning when the error condition goes away, the error will disappear.

EPROM checksum error Err 1

An EPROM checksum error occurs on power up when the bytes in the EPROM do not add up to 0. The EPROM is programmed at time of manufacture in such a way that all valid bytes should add up to 0.

EEPROM checksum error Err 2

An EEPROM checksum error occurs on power up when the bytes in the EEPROM do not add up to 0.

RAM error Err 3

A RAM error occurs on power up when a RAM test is executed and fails. The RAM test writes certain values to the RAM memory locations and then reads them back. If the value read is equal to the value written in all cases the RAM test passes, otherwise it fails.

Calibration Error Err 4

A Calibration Error occurs when stored calibration values have been corrupted and may make the controller temperature readings inaccurate.

A/D underflow error Err 5 (channel 1), Err 9 (channel 2)

An A/D underflow error occurs when the electrical signal from the sensor is outside of the measurable range of the A/D circuit. This can be caused by incorrect sensor type, reversed sensor leads, or measuring temperatures outside the sensor range.

A/D overflow error Err 6 (channel 1), Err 10 (channel 2)

An A/D overflow error occurs when the electrical signal from the sensor is either missing or outside the measurable range of the A/D circuit. This can be caused by an open sensor or measuring temperatures outside the sensor range.

Under range error Err 7 (channel 1), Err 11 (channel 2)

The under range error occurs when the control is unable to accurately calculate the temperature even though the A/D is able to measure the signal. This is caused by measuring temperature below the temperature range of the control.

Over range error Err 8 (channel 1), Err 12 (channel 2)

The over range error occurs when the control is unable to accurately calculate the temperature even though the A/D is able to measure the signal. This is caused by measuring temperature above the temperature range of the control

Ambient out of range error Err 13

An ambient out of range error occurs when the ambient sensor produces a signal that is either above or below the range of temperatures that can be calculated for ambient. This range of temperatures is larger than the operational range of the control its self.

Real-time Clock error Err 14

A Real-time Clock error occurs when timekeeping components fail. This error message will appear in the display only at power up. When this error occurs, the controller disables the Real-time Clock functions and the Power Loss Menu Resume function. The part number in Wathelp diagnostics will change from F2HA - _ _ _ _ - 1 _ _ _ to F2HA - _ _ _ _ - 0 _ _ _ .

Order of Priority

The order of priority is as follows starting with the highest:

EPROM checksum error

EEPROM checksum error

RAM error

Calibration error

Channel 1 A/D underflow error

Channel 1 A/D overflow error

Channel 1 under range error

Channel 1 over range error

Channel 2 A/D underflow error

Channel 2 A/D overflow error

Channel 2 under range error

Channel 2 over range error

Ambient out of range

Real-time clock error

Note: See the Troubleshooting Chart in this Appendix for probable causes and possible solutions to alarm situations.

Glossary of Terms

Application Any of the 28 (or more) equipment-specific purposes for which the MINICHEF 2000 includes software programs. Each application has a number.

Automatic control One-touch cooking, which requires configuration of the preprogrammed menus.

Auto-tuning A time-saving feature, auto-tuning allows the controller to explore the responsiveness of the system in order to determine an effective set of parameters for PID control. To do this it crosses an auto-tune set point three times, then controls at the normal set point using the new parameters.

Configuration Mode The level of programming in which equipment type features and parameters are specified.

Convection Oven An oven that uses a fan to circulate heat and minimize cooking times.

Cook and Hold Oven An oven that cycles between a cook cycle and a hold cycle in order to maintain food at a servable temperature or maximize meat tenderness.

Deepfat Fryer A fryer that cooks food in large amounts of hot oil. Efficiency depends on the fryer's power input, production rate, and the longevity of the cooking oil.

Derivative The rate of change in a process variable. Also known as rate. See PID.

DIN Deutsche Industrial Norms (DIN). A set of technical, scientific and dimensional standards developed in Germany. Many DIN standards have worlwide recognition.

Griddle Good for crisping, browning and flavor development, griddles can be one-sided or two-sided. Two-sided griddles (also called Clam Shell griddles) reduce cooking times by cooking both sides of the food simultaneously.

Hysteresis A change in the process variable required to re-energize the control or alarm ouput. Sometimes called switching differential.

Integral Control action that automatically eliminates offset, or droop, between set point and actual process temperature. Inverse of Reset.

JIS Joint Industrial Standards, also Japanese Industrial Standards Committee (JISC). Establishes standards on equipment and components.

Keys:

Down-arrow key (F) On the Protoyping/Training Overlay, the right key in the bottom row, which allows user to move down the lists.

Edit key (A) On the Protoyping/Training Overlay, the left key in the top row, which allows user to access the next level of parameters or values.

Enter key (B) On the Protoyping/Training Overlay, the center key in the top row, which allows user to enter a chosen value and return to the previous level.

Escape key (E) On the Protoyping/Training Overlay, the center key in the bottom row, which allows user to return to the original value, when editing a value.

Home key (D) On the Protoyping/Training Overlay, the left key in the bottom row, which allows user to move directly to Operation Mode with a 2-second key press.

Up-arrow key (C) On the Protoyping/Training Overlay, the right key in the top row, which allows user to move up the lists.

Manual control A way of operating foodservice equipment that requires end-users to select and use manual setting keys.

Manual Setting keys Keys that allow end-users to manually set time, temperature, etc., individually.

Menu Set of cooking instructions that can be programmed into the MINICHEF for end-user convenience. A menu can include times, temperatures, fan speeds, etc.

Menu Select key A key that allows end-users to access and select from a list of pre-programmed menus.

On/off control On/off control switches the output either full on or full off, depending on the input, set point and hysteresis values. The hysteresis value creates a buffer zone that increases the time interval that the output is off or on. With hysteresis set to 1º the process value would stay closer to the set point, but the output would switch on and off more frequently, causing "chattering."

Operation Mode The end-user mode that occurs after power-up. It allows end-users to cook foods using pre-set keys and menus. Operation Mode is the MINICHEF 2000 default mode.

PID Uses derivative (rate) control to minimize the overshoot in a Proportional-Integral controlled system. Derivate (rate) adjusts the output based on the rate of change in the temperature or process value.

Program Mode The level of programming in which the automatic menus are set.

Programmed menu keys Keys programmed to allow users to choose pre-set cooking instructions.

Proportional control Some processes need to maintain a temperature or process value closer to the set point than on/off control can provide. Proportional control provides closer control by adjusting the output when the temperature or process value is within a proportional band. When the value is in the band, the controller adjusts the output based on how close the process value is to the set point: the closer to set point the lower the output. This is similar to backing off on the gas pedal of a car as you approach the speed limit. It keeps the temperature or process value from swinging as widely as it would with simple on/off control. However, when a system stabilizes, the temperature or process value tends to "droop" short of the set point.

Rate Anticipatory action that is based on the rate of temperature change, and compensates to minimize overshoot and undershoot. See derivative.

Reset Control action that automaticaly eliminates offset, or droop, between set point and actual process temperature. Inverse of Integral.

Rotisserie Oven An oven that slowly cooks meat on a rotating spit, and allows cooking of single or staggered batches of food.

Shelf Timing Oven An oven with one temperature setting and a timer that permits individual cooking times to be set for different shelves.

Timer Can accompany any type of food equipment to help time food cooking cycles and alert users to perform related tasks.

Specifications (1032)

Control Mode
- Single and dual heat channels, PID or on/off.[1]
- Microprocessor-based, programmable, reverse-acting control outputs.
- User-selectable embedded application software defines operation of display, keys, inputs, outputs, timing action.
- One-step auto-tuning, WatHelp diagnostics, WatCurve temperature compensation.

Agency
- CE approved:
  89/336/EEC Electromagnetic Compatibility Directive
  -EN 50081-1: Emissions
  -EN 50082-1: Immunity
  73/23/EEC Low-Voltage Directive
  -EN 60730-1 and EN 60730-2-9: Safety
- NSF Listed, Criteria 2.[5]
- AGA: UL tested to AGA standard Z21.23, UL File #E43684.
- UL and C-UL recognized, UL 197, 873, 991 and CSA standard C22.2-24, File # E43684.

Operator Interface
- Membrane overlay, contamination and water resistant, (supplied by customer).
- LED display, 5-digit, 0.56 in high, red.
- Displays times, temperatures, user prompts and diagnostic codes.
- User-selectable time and temperature display formats.
- Temperature display formats—˚F or ˚C.
- Time display formats—H:MM:SS, HH:MM, or MMM:SS.
- 8 discrete indicator LEDs, red.
- 6 tactile feedback keys.
- Menu-driven operation and manual modes available.
- WatHelp diagnostics.
- Real-time clock option displays time of day.

Accuracy
- Calibration accuracy and sensor conformity[2]: ± 2.0°F for Type J thermocouple and RTD, ± 0.35% of span for Type K and E thermocouples, ±1 LSD, 77°F ± 5°F ambient and rated line voltage of ±10%.
- Accuracy span: 1000°F (540°C) minimum.
- Temperature stability: ± 0.15˚F/˚F (0.15˚C/˚C) change in ambient typical.

Sensors/Inputs
- Contact inputs, TTL compatible with internal pull-up resistor, two available.
- Thermocouple,[3] software selectable Type J, K or E, 32 to 1200°F. (Dual-channel applications require at least one ungrounded thermocouple).
- RTD,[3] 2- or 3-wire, platinum, 100, 500, 1000Ω, at 0°C, software selectable DIN or JIS curves, 0 to 1200°F (3-wire will function as 2-wire).
- Input A/D resolution: 15 bit.

Output Options
- Solid-state relay, 0.4A, with or without contact suppression.
- Switched dc signal, 4.5V to 5.25V, 30mA maximum output, minimum load resistance > 150Ω, non-isolated.

Audible Output Options
- Switched dc signal, 4.5V to 5.25V, 30mA maximum output, minimum load resistance > 150Ω, non-isolated.
- Internal audible alarm, 75dB at 10 cm.

Connectors
- Sensor Input Terminal Strip[4]: RIACON, 6-position, quick-connect.
- Power Supply & Input/Output Terminal[4]: AMP, 15-position, quick-connect.

Power/Line Voltage
- 20.4 to 26.4V~ (ac), 47 to 63Hz.
- 15VA maximum.
- For CE applications, input power must be limited to 15W external to the control.
- Program retention upon power failure via non-volatile memory.
- Battery/real-time clock option: 6-year lithium battery, provides power backup upon power failure, operation resumption after power recovery, ability to display time of day.

Operating Environment
- 32 to 176°F (0 to 80°C), 0 to 90% RH, non-condensing.

Storage Temperature
- -40 to 176°F (-40 to 80°C).

Mechanical
- Case: polycarbonate Lexan with adjustable mounting collar (vertical or horizontal orientation), designed for mounting on 16-, 18-, 20- and 22-gauge panels.
- Internal panel mounting requires a specified panel cutout and four #6-32 studs or equivalent.
- Overall width x height x depth: horizontal - 4.13 in x 3.25 in x 2.00 in; vertical - 3.25 in x 4.13 in x 2.00 in (Assumes mating connectors are attached. Does not include wire bundle space requirements.).
- Vibration: 2g, 10 to 150Hz, applied in any one of three axes.
- Weight: 6.50oz maximum.

Program Storage
- All non-embedded user and factory programs are stored in non-volatile memory. Can be changed by reprogramming.

Sample/Update Rates
- 1 input: 4Hz.
- 2 inputs: 4Hz.
- PID: 1Hz.
- Control outputs: 100Hz.
- Display: 10Hz.

[1] The MINICHEF 2000 controller is to be used in systems with an external high temperature limiting device.

[2] Thermocouple lead resistance of 200Ω causes < 1°C error. RTD, 22 gauge wire will not contribute more than 0.086°F error/ft.

[3] Dual channel applications require either two thermocouple sensors or two identical RTD sensor types.

[4] For mating connector information, see Ordering Information Accessory section.

[5] Certified for thermometer accuracy (oven and hot food holding applications from 32°F to 60°F) when used with RTD or type J thermocouple probes.

Ordering Information

(1033)

F 2 H A - ___ 1 - __ A A

MINICHEF™ 2000
Cooking controller with numerous food equipment application software sets, single and dual channel on/off or PID temperature regulation, timer and machine-function control, microprocessor-based, programmable, auto-tuning, WatCurve™, WatHelp diagnostics, 24V~ (ac) power input, agency approved, flush mounted (membrane faceplate supplied by customer).

Inputs
1 = Dual thermocouple, Type J, K or E
2 = Dual RTD, platinum, 100Ω, curve selectable
3 = Dual RTD, platinum, 500Ω, curve selectable
4 = Dual RTD, platinum, 1000Ω, curve selectable

Note: All models include two event inputs, switched dc logic signal, non-isolated.

Output Number 1
1 = Switched dc, 5V nominal, 30mA, non-isolated
2 = Solid-state relay, Form A, 0.4A, without RC suppression
3 = Solid-state relay, Form A, 0.4A, with RC suppression

Output Number 2
1 = Switched dc, 5V nominal, 30mA, non-isolated
2 = Solid-state relay, Form A, 0.4A, without RC suppression
3 = Solid-state relay, Form A, 0.4A, with RC suppression

Event Outputs 1 and 2
1 = 2 event outputs, switched dc, 5V nominal, 30mA, non-isolated

Battery and Real-time Clock
0 = None
1 = Includes battery and real-time clock

Audible Alarm
0 = Alarm signal available at connector, switched dc, 5V nominal, 30mA, non-isolated
1 = Internal alarm included

Software
AA = Standard Food Equipment Application Software Set
XX = Custom Set-up parameters or Made-To-Order custom software. Consult your local Watlow Sales Engineer. Code number assigned by factory.

Part Numbers & Accessories

MiniChef 2000 Accessories

0836-0442-0000	Sensor Input Mating Connector, (RIACON #31007106), 6-position, quick-connect terminal, screw connection for 28-14 AWG wires, tighten to 7 in/lb
A001-0298-0000	Power Supply and I/O Mating Connector Kit. Includes: – 1 AMP #1-640523-0, 15-position, quick-connect terminal – 15 AMP #641300-1 crimp pins
0238-0679-0000	Prototyping & Training Membrane Overlay, adhesive-backed, 4.75 in x 4.75 in
0830-0479-0000	Prototyping EPROM Extraction Tool, AMP #821980-1
A001-0249-0001	120V~ to 24V~ (ac), stepdown transformer, class 2, quick-connect terminals included
A001-0249-0002	208/240V~ to 24V~ (ac), step-down transformer, class 2, quick-connect terminals included

Recommended Sources of Supply for Miscellaneous Items

DURA-TECH, Inc.
LaCrosse, WI
(608) 781-2570

- *Custom Membrane Faceplates*

AMP, Inc.
Harrisburg, PA
1-800-522-6752

- *Prototyping EPROM Extraction Tool* Part No. 821980-1
- *Pin Crimping Hand Tools* Part No. 90325-1 or 58514-1
- *Pin Extraction Hand Tool* Part No. 455822-2

RIA Electronic, Inc.
Eatontown, NJ
(908) 389-1300

- *RIACON Connectors*

MiniChef 2000 Documentation

WMC2-XUGN-0000	The Complete MiniChef 2000 User Guide
WMC2-XADN-0000	The Complete MiniChef 2000 User Guide on CD
WMC2-XTDN-0000	MiniChef 2000 Tutorial Disk
WMC2-XSGN-0000	Hardware & Software Setup Guide
WMC2-XAGN-0001	Cook-&-Hold Oven Application Guide
WMC2-XAGN-0002	Convection Oven Application Guide
WMC2-XAGN-0003	Deepfat Fryer Application Guide
WMC2-XAGN-0004	Griddle Application Guide
WMC2-XAGN-0005	Timer Application Guide
WMC2-XAGN-0006	Shelf Timer Application Guide
WMC2-XAGN-0007	Rotisserie Oven Application Guide

Watlow Controls

Watlow Controls is a division of Watlow Electric Mfg. Co., St. Louis, Missouri, a manufacturer of industrial electric heating products since 1922. Watlow begins with a full set of specifications and completes an industrial product that is manufactured totally in-house, in the U.S.A. Watlow products include electric heaters, sensors, controls and switching devices. The Winona operation has been designing solid state electronic control devices since 1962, and has earned the reputation as an excellent supplier to original equipment manufacturers. These OEMs depend upon Watlow Controls to provide compatibly engineered controls that they can incorporate into their products with confidence. Watlow Controls resides in a 100,000-square-foot marketing, engineering and manufacturing facility in Winona, Minnesota.

Technical Assistance

If you encounter a problem with your Watlow controller, refer to the Troubleshooting Chart in this guide. Also review all of your configuration information for each step of the setup to verify that your selections are consistent with your applications.

If the problem persists after checking all the steps, you can get technical assistance by calling Watlow Controls at (507) 454-5300, between 7 a.m. and 5 p.m. CST, and asking for an applications engineer. When you call have the following information on hand: the controller's part number, date code, serial number, software revision number, and application number. Much of this information is available on the controller case. All of this information is also available via the MINICHEF 2000 main display by accessing the WatHelp Diagnostics Function under in the Configuration Mode.

We Value Your Feedback

Your comments and suggestions on this manual are welcome. Please send them to, Technical Writer, Watlow Controls, 1241 Bundy Blvd., P.O. Box 5580, Winona, MN 55987-5580 or call (507) 454-5300 or fax (507) 452-4507.

Contact

- Phone: (507) 454-5300.
- Fax: (507) 452-4507.
- For technical support, ask for an Applications Engineer.
- To place an order, ask for Customer Service.
- To discuss a custom option, ask for the MINICHEF 2000 Product Manager.

Warranty

The MINICHEF 2000 is warranted to be free of defects in material and workmanship for 36 months after delivery to the first purchaser for use, providing that the unit has not been misapplied. Since Watlow has no control over its use, or misuse, we cannot guarantee against failure. Watlow's obligations hereunder, at Watlow's option, are limited to replacement or refund of purchase price of a unit which upon examination proves to be defective within the warranty period. This warranty does not apply to damage resulting from transportation, alteration, misuse, or abuse.

Returns

- Call or fax Customer Service for a Return Material Authorization (RMA) number before returning a control.
- Put the RMA number on the shipping label, and also on a description of the problem.
- 20% of net price restocking charge applies to all standard units returned to stock.

Note: All documentation of the MINICHEF 2000 is subject to change without notice.

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Declaration of Conformity

CE 97

WATLOW CONTROLS
1241 Bundy Boulevard
Winona, Minnesota 55987 USA

MINICHEF 2000

Declares that the following product: ***English***

Designation:	MINICHEF 2000
Model Number(s):	F2(H or U)(A or C)-(1, 2, 3 or 4)(1, 2 or 3)(1, 2 or 3) 1-(0 or 1)(0 or 1)(Any two letters or numbers)
Classification:	Electronic incorporated Class III temperature controller, Type 2C action, for use in light industrial
RatedVoltage:	24V~ (VAC)
Rated Frequency:	50/60 Hz
Maximum Input Power:	15 Watts

Meets the essential requirements of the following European Union Directive(s) using the relevant section(s) of the normalized standards and related documents shown:

89/336/EEC Electromagnetic Compatibility Directive

EN 50082-1:	**1995**	**EMC Generic immunity standard, Part 1: Residential, commercial and light industry**
EN 61000-4-2:	1995	Electrostatic discharge
EN 61000-4-4:	1995	Electrical fast transients
EN 61000-4-5:	1995	Surge immunity
EN 61000-4-6:	1996	Conducted immunity
EN 61000-4-8:	1993	Power frequency magnetic field immunity
EN 61000-4-11:	1994	Voltage dips, short interruptions and voltage variations immunity
ENV 50140:	1994	Radiated immunity
ENV 50204:	1995	Cellular phone
EN 50081-1:	**1994**	**EMC Generic emission standard, Part 1: Residential, commercial and light industry**
EN 55011:	1991	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical radio-frequency equipment (Class B)

73/23/EEC Low-Voltage Directive

EN 60730-1:	**1993**	**Automatic electrical controls for household and similar use, Part 1: General requirements**
EN 60730-2-9:	1995	Automatic electrical controls for household and similar use, Part 2; Particular requirementsSection 2.9 Temperature sensing controls

Déclare que le produit suivant : ***Français***

Désignation :	MINICHEF 2000
Numéro(s) de modèle(s) :	F2 (H ou U) (A ou C)-(1, 2, 3 ou 4) (1, 2 ou 3)(1, 2 ou 3) 1-(0 ou 1) (0 ou 1) (deux lettres ou chiffres quelconques)
Classification :	Contrôleur de température Classe III électronique, action type 2C, pour les utilisations industrielles légères
Tension nominale :	24 V ~ (alternatif)
Fréquence nominale :	50/60 Hz
Alimentation d'entrée maximale :	15 W

Conforme aux exigences de la (ou des) directive(s) suivante(s) de l'Union Européenne figurant aux sections correspondantes des normes et documents associés ci-dessous :

89/336/EEC Directive de compatibilité électromagnétique

EN 50082-1 :	**1995**	**Norme générique sur l'immunité, Partie 1 : Environnement résidentiel, commercial et industriel léger**
EN 61000-4-2 :	1995	Décharge électrostatique
EN 61000-4-4 :	1995	Transitoires rapides électriques
EN 61000-4-5 :	1995	Immunité aux surtensions
EN 61000-4-6 :	1996	Immunité conduite
EN 61000-4-8 :	1993	Immunité aux champs magnétiques de fréquence industrielle
EN 61000-4-11 :	1994	Immunité aux chutes de tension, brèves interruptions et variations de tension
ENV 50140 :	1994	Immunité rayonnée
ENV 50204 :	1995	Téléphone cellulaire
EN 50081-1 :	**1994**	**Norme générique sur les émissions, Partie 1 : Environnement résidentiel,commercial et industriel léger**
EN 55011 :	1991	Limites et méthodes de mesure des caractéristiques des perturbations radioélectriques des appareils industriels, scientifiques et médicaux (Classe B)

73/23EEC Directive sur les basses tensions

EN 60730-1 :	**1993**	**Commandes électriques automatiques à usage domestique et similaire, Partie 1: Exigences générales**
EN 60730-2-9 :	1995	Commandes électriques automatiques à usage domestique et similaire, Partie 2: Exigences particulières, Section 2.9 Commandes de détection de la température

Erklärt, daß das folgende Produkt: ***Deutsch***

Beschreibung:	MINICHEF 2000
Modellnummer(n):	F2 (H oder U)(A oder C)-(1, 2, 3 oder 4)(1, 2 oder 3)(1, 2 oder 3) 1-(0 oder 1)(0 oder 1)(2 beliebige Buchstaben oder Zahlen)
Klassifikation:	Eingebautes elektronisches Temperaturregelsystem der Klasse III, Typ 2C Aktion, für den Einsatz in der Leichtindustrieumwelt
Nennspannung:	24 V~ (V Wechselstrom)
Nennfrequenz:	50/60 Hz
Maximaler Leistungsverbrauch:	15 W

Erfüllt die wichtigsten Normen der folgenden Anweisung(en) der Europäischen Union unter Verwendung des wichtigsten Abschnitts bzw. der wichtigsten Abschnitte der normalisierten Spezifikationen und der untenstehenden einschlägigen Dokumente:

89/336/EEC EWG Elektromagnetische Verträglichkeit

EN 50082-2:	**1995**	**EMC-Rahmennorm für Störsicherheit, Teil 1: Wohngegenden, Handelsverkehr und Leichtindustrie**
EN 61000-4-2:	1995	Elektrostatische Entladung
EN 61000-4-4:	1995	Elektrische schnelle Stöße
EN 61000-4-5:	1995	Spannungsstoßimmunität
EN 61000-4-6:	1996	Störimmunität
EN 61000-4-8:	1993	Magnetische Felder
EN 61000-4-11:	1994	Immunität gegen Spannungsgefälle, kurze Unterbrechungen und Spannungsabweichungen
ENV 50140:	1994	Strahlungsimmunität
ENV 50204:	1995	Mobiltelefon
EN 50081-2:	**1994**	**EMC-Rahmennorm für Emissionen, Teil 1: Wohngegenden, Handelsverkehr und Leichtindustrie**
EN 55011:	1991	Beschränkungen und Methoden der Messung von Funkstörungsmerkmalen industrieller, wissenschaftlicher und medizinischer Hochfrequenzgeräte (Klasse B)

72/23/EEC EWG Niederspannungsrichtlinie

EN 60730-1:	**1993**	**Automatische elektrische Regelsysteme für den Haushalt und ähnlichen Einsatz, Teil 1: Allgemeine Richtlinien**
EN 60730-2-9:	1995	Automatische elektrische Regelsysteme für den Haushalt und ähnlichen Einsatz, Teil 2: Spezifische Richtlinien Abschnitt 2.9, Temperaturregelsysteme

Declara que el producto siguiente: ***Español***

Designación:	MINICHEF 2000
Números de modelo:	F2 (H o U)(A o C)-(1, 2, 3 ó 4)(1, 2 ó 3)(1, 2 ó 3) 1-(0 ó 1)(0 ó 1)(Cualquier combinación de dos letras o números)
Clasificación:	Control de temperatura electrónico incorporado, Clase III, acción tipo 2C, para uso en aplicaciones de industria ligera
Tensión nominal:	24 V ~ (Vca)
Frecuencia nominal:	50/60 Hz
Potencia de entrada máxima:	15 vatios

Cumple con los requisitos esenciales de las siguientes Directivas de la Unión Europea, usando las secciones pertinentes de las reglas normalizadas y los documentos relacionados que se muestran:

89/336/EEC - Directiva de Compatibilidad Electromagnética

EN 50082-1:	**1995**	**Norma de inmunidad genérica del EMC, Parte 1: Ambiente residencial, comercial e industria ligera**
EN 61000-4-2:	1995	Descarga electrostática
EN 61000-4-4:	1995	Perturbaciones transitorias eléctricas rápidas
EN 61000-4-5:	1995	Sobretensión
EN 61000-4-6:	1996	Inmunidad conducida
EN 61000-4-8:	1993	Campos magnéticos
EN 61000-4-11:	1994	Caídas de tensión, interrupciones breves y variaciones de tensión
ENV 50140:	1994	Inmunidad radiada
ENV 50204:	1995	Teléfono portátil
EN 50081-1:	**1994**	**Norma de emisión genérica del EMC, Parte 1: Ambiente residencial, comercial e industria ligera**
EN 55011:	1991	Límites y métodos de medición de características de perturbaciones de radio correspondientes a equipos de radiofrecuencia industriales, científicos y médicos (Clase B)

73/23/EEC Directiva de Baja Tensión

EN 60730-1:	**1993**	**Controles eléctricos automáticos para electrodomésticos y aparatos de uso similar, Parte 1: Requerimientos generales**
EN 60730-2-9:	1995	Controles eléctricos automáticos para electrodomésticos y aparatos de uso similar, Parte 2: Requerimientos particulares Sección 2.9, Controles para detección de temperatura

Erwin D. Lowell
Name of Authorized Representative

Winona, Minnesota, USA
Place of Issue

General Manager
Title of Authorized Representative

March, 1997
Date of Issue

Signature of Authorized Representative

WMC2-XCEM

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